

Synchronous collaborative L2 writing with technology

Interaction and Learning

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Zusammenfassung

Die vorliegende Studie untersuchte den synchronen kollaborativen Schreibprozess von erwachsenen Englischler/-innen in Kleingruppen unter Benutzung von *Shared Documents*-Technologien. Vierundzwanzig sprachlich weit fortgeschrittene Teilnehmer/-innen eines vom Autor geleiteten Englischkurses für Medizinstudierende wurden veranlasst in acht Kleingruppen (à drei Teilnehmer/-innen) gemeinschaftlich einen medizinischen Fachtext zu verfassen. Die Zusammenarbeit fand synchron, d.h. im Unterricht und zur gleichen Zeit statt. Sämtliche Interaktion (gemeinsames Schreiben, Chatten und Kommentieren) fand innerhalb von *Google Docs*, einem web-basierten Textverarbeitungsprogramm, statt. Ziel der Arbeit war, diese neue Art der Zusammenarbeit explorativ zu erschließen, jedoch immer mit Blick auf die sprachlern- und spracherwerbsrelevanten Aspekte des kommunikativen Fremdsprachenunterrichts, insbesondere kognitive und sozio-kulturelle Theorien des Zweitspracherwerbs. Aus diesem Forschungsinteresse leitete sich auch die übergeordnete Fragestellung ab: „Wie verhandeln Kleingruppen von Englischler/-innen den synchronen kollaborativen Schreibprozess mit *Google Docs*“? Da synchrone Zusammenarbeit an einem Text erst durch die *Shared Documents*-Technologie möglich wurde, fand das Phänomen bzw. der Einsatz von *Shared Documents*-Technologie im Sprachunterricht bisher kaum Beachtung in der Fremdsprachdidaktik. Diese Studie will durch einen qualitativen Ansatz das Phänomen der synchronen schriftlichen Zusammenarbeit im Fremdsprachenunterricht explorativ beleuchten. Folgende drei Aspekte der synchronen kollaborativen Zusammenarbeit wurden in Form von Forschungsfragen operationalisiert und untersucht:

1. Wie viel Zeit verbringen Kleingruppen von Englischler/-innen in den jeweiligen Kommunikationskanälen von *Google Docs* in einer synchronen kollaborativen Schreibaktivität“?
2. Worauf konzentrieren sich Kleingruppen von Englischler/-innen in ihren aufgabenbezogenen Metagesprächen?
3. Wie erleben Englischler/-innen den synchronen kollaborativen Texterstellungsprozess mit *Google Docs*?

Methodisch verfolgte diese Arbeit einen qualitativ-explorativen Ansatz. Mithilfe der Bordmittel von *Google Docs* konnten sämtliche Interaktionen aus drei Quellen (Revisionsgeschichte des Texts, Chatlog, Kommentarhistorie) erfasst und in einem chronologisch organisierten Datensatz konsolidiert werden. Zusätzlich wurden die Teilnehmer/-innen mithilfe eines Fragebogens unmittelbar nach Abschluss der Aktivität zu Ihrer Erfahrung befragt. Sowohl die Aushandlungsprozesse als auch die offenen Rückmeldungen im Fragebogen wurden im Sinne der qualitativen Inhaltsanalyse kodiert und ausgewertet. Die Ergebnisse der Datenauswertung wurden auf die für die Arbeit und das Phänomen wesentlichen theoretischen Konzepte der Zweitspracherwerbs-, Schreib- und Didaktikforschung bezogen.

Aus zweitspracherwerbtheoretischer Sicht kommt der Interaktion zwischen Sprachlernenden eine besondere Bedeutung zu. Durch die Produktion und Aushandlung von sprachlichen Äußerungen in der Zielsprache schaffen die Lernenden Anlässe, um sich mit der Zielsprache kritisch auseinanderzusetzen. In diesem Zusammenhang leiten die Lernenden Regeln ab (oder testen diese direkt am sprachlichen Material) und machen sich so sprachinhärente Funktionsweisen bewusst, die sie bei bloßer Sprachrezeption (Hören und Lesen) nicht bewusst wahrnehmen würden. Da eine zielgerichtete Interaktion auch immer wieder inhaltliche oder sprachliche Missverständnisse hervorruft, müssen die Lernenden ihr interaktives Handeln ihrem Gegenüber anpassen. Aus Sicht der soziokulturellen Lerntheorien vermag Interaktion nicht nur sprachliche oder inhaltliche Missverständnisse zu beseitigen, sondern ist vielmehr ein Schlüssel zum Lernen selbst. Bei sprachbezogenen Metagesprächen, wo sozusagen Sprache durch Sprache verhandelt wird, machen sich die Lernenden formsprachliche Phänomene bewusst und sind so erst in der Lage, korrekte Äußerungen in der Zielsprache zu produzieren. Die Analyse der Gesprächsepisoden, die bei der synchronen kollaborativen Texterstellung entstanden waren, sollte aufdecken, ob und wie die Teilnehmer/-innen die Aufgabenbewältigung verhandeln und welchen Stellenwert sprachliche Aspekte bei dieser Aushandlung einnahmen (Forschungsfrage zwei). Die

beiden am häufigsten verhandelten Themen waren „Workflow Management“ (Organisation der Zusammenarbeit) und „Content“ (Inhalt). Das dritthäufigste Thema der Metagespräche drehte sich jedoch um Sprache: In sogenannten „Meaning-oriented language-related episodes“ tauschten sich die Teilnehmenden primär zu Fragen der Wortwahl und phraseologischen Problemen aus (gefolgt von direkten Übersetzungen vom Deutschen ins Englische). Die Teilnehmenden traten also in einen sprachbezogenen, kollaborativen Dialog, in dem sprachliche Probleme verhandelt und bewältigt wurden, die die Teilnehmenden alleine wohlmöglich nicht hätten lösen können – ein klarer Mehrwert der kollaborativen Arbeitsform. Oberflächennahe Phänomene wie Orthographie, Interpunktion, oder Fragen des Layouts wurden kaum verhandelt. Zum einen erlaubt die Technik kleinere Änderungen leicht und schnell direkt am Text durchzuführen. Zum anderen handelten die sprachlich weit fortgeschrittenen Lernenden unter Zeitdruck. Zusätzliche ergab sich aus der Datenanalyse eine negative Korrelation zwischen Chataufkommen und erzielter Leistung in den finalen Texten. Die Gruppen eins und fünf verbrachten, verglichen mit dem Rest der Kohorte, wesentlich mehr Zeit mit Chateingaben. Vor allem inhaltliche und organisatorische Fragen beschäftigten diese Gruppen, wodurch wertvolle Zeit bei der Fertigstellung des Zieltextes fehlte.

Neben der Interaktion spielt der Schreibprozess bei der kollaborativen Texterstellung eine zentrale Rolle. Etablierte Modelle beschreiben den Schreibprozess von Individuen meist als dynamischen Prozess, in dem verschiedene Sub-Prozesse wie Planung, Verschriftlichung und Revision dynamisch ineinandergreifen und nicht zwangsweise linear aufeinanderfolgen. Bei der Analyse der aufgabenbezogenen Metagespräche der Teilnehmer/-innen konnte gezeigt werden, dass die Schreiber/-innen Teile des Schreibprozesses verbalisieren. Folglich dominierten im ersten Drittel der Schreibaktivität inhaltsbezogene und organisatorische Gespräche, was der Planungsphase entspricht. Im zweiten Drittel der Schreibaktivität wurden v.a. sprachliche und inhaltlich-strukturelle Fragen behandelt. D.h. die in der ersten Phase verhandelten Arbeitsweisen und Inhalte wurden in den Text übersetzt. Im letzten Drittel der Schreibaktivität nahm der

Gesprächsbedarf insgesamt ab, wobei alle vier Themen (Organisation, Inhaltliches, Sprachliches, Strukturelles) punktuell weiter behandelt wurden. Dies bestätigt zum einen die dynamische Natur des Schreibprozesses, da die Schreiber/-innen zumindest punktuell bestimmte Sub-Prozesse des Schreibens immer wieder aufgreifen. Zum anderen, konnte somit gezeigt werden, dass Individuen, wenn sie eine Aufgabe gemeinschaftlich mit anderen lösen, Teile ihrer Denkprozesse verbalisieren. Dies macht kollaborative Unterrichtsarrangements zu einem wertvollen Werkzeug, um Lernprozesse sichtbar zu machen – besonders dann, wenn sämtliche Aushandlungen in einer digitalen Umgebung stattfinden und damit bereits verschriftlich vorliegen.

Der Ausgangspunkt der synchronen, kollaborativen Schreibaktivität war eine komplexe Aufgabe (das gemeinschaftliche Erstellen einer englischsprachigen Patientenübergabe in Form einer E-Mail). Aufgabenorientiertes Fremdsprachenlernen (oder engl. *task-based language learning*) macht für die Lernenden und ihre Lernziele relevante Inhalte (statt sprachliche Phänomene) zum Ausgangspunkt des Sprachunterrichts. Gleichwohl spielen sprachliche Aspekte bei der Bewältigung der Aufgabe eine wichtige Rolle, um das zuvor klar definierte Ergebnis zu erreichen. Die Zusammenarbeit fand synchron, d.h. im Unterricht und zur gleichen Zeit statt. Sämtliche Interaktionen (gemeinsames Schreiben, Chatten und Kommentieren) fand innerhalb von *Google Docs*, einem web-basierten Textverarbeitungsprogramm, statt. Da das kommunikative Verhalten der Teilnehmenden verschriftlicht war, hatten diese auch jederzeit Zugriff auf alle Chatverläufe, Texte, und Kommentare. Diese unmittelbare Konfrontation mit sprachlichem Material hat das Potenzial die Sprachbewusstheit der Lernenden zu erhöhen. Bei der Analyse der Kanalnutzung innerhalb von *Google Docs* (Forschungsfrage eins) zeigten sich zeitliche Überlappungen in zweifacher Weise: Gleichzeitige Aktivität von Teilnehmer/-innen in Chat und Text und gleichzeitige Aktivität von zwei oder mehr Teilnehmer/-innen im Text. Im Rahmen der Analyse wurde versucht, aus diesen Präferenzen der Kanalnutzung Rückschlüsse über bestimmte Muster bei der gemeinschaftlichen Aufgabenbewältigung (Kooperation vs. Kollaboration) zu

ziehen. Das Kanalnutzungsverhalten der Teilnehmer/-innen innerhalb des *Google Docs* Dokuments konnte jedoch keine verlässlichen Hinweise auf ein kooperatives (Arbeitsteilung) oder kollaboratives (gemeinschaftliches Arbeiten) Muster liefern. Da die Aktivität in einem synchronen Setting stattfand, wo Interaktion zwischen den Akteuren in deutlich höherer Frequenz als in asynchronen Settings auftritt, scheint die Einstufung von synchroner interaktiver Texterstellung (grundsätzlich) als Kollaboration naheliegend. Das Aufgabendesign kann teilweise als artifiziell eingestuft werden, da sich die Teilnehmenden zur gleichen Zeit am gleichen Ort befanden und dennoch computer-vermittelt miteinander interagierten. Zudem wurde den Teilnehmenden neben dem Erwartungshorizont der Aufgabe keine Anleitung zur synchronen kollaborativen Texterstellung zur Verfügung gestellt. Beide Entscheidungen im Aufgabendesign wurden bewusst getroffen, um diese neue Art der Zusammenarbeit möglichst wenig zu verfälschen und das natürliche Verhalten der Teilnehmer/-innen explorativ zu erforschen. Folglich hatten wenige Teilnehmer/-innen Probleme mit der ausschließlich schriftlichen Interaktion ohne weitere Anweisungen. Dies schlug sich in den Antworten in der Evaluation nieder, wo Teilnehmende auf die bisweilen Verwirrung stiftende Dynamik und den Mangel an Möglichkeiten zum mündlichen Austausch hinwiesen. Diese kritischen Rückmeldungen konnten den Gruppen zugewiesen werden, die in den finalen Texten am schlechtesten abschnitten. Diese Gruppen verbrachten mehr Zeit mit Chateingaben als die übrigen Gruppen, da sie sich in inhaltlichen und organisatorischen Fragen als unsicher erwiesen. Als besondere Vorzüge dieser Art dieser Art der Zusammenarbeit wurde von den Teilnehmer/-innen v.a. Effizienz, Transparenz und die vielen Interaktionsmöglichkeiten genannt. Genau diese Vorzüge wurden von Gruppen als besonders gewinnbringend herausgestellt, die in den finalen Texten am besten abschnitten.

Aus den Ergebnissen der vorliegenden Studie ergeben sich verschiedene Implikationen für den fremdsprachlichen Unterricht und die Forschung. Die Integration von webbasierten Technologien zur Zusammenarbeit im Unterricht stellen v.a. deutsche Lehrkräfte und Forscher/-innen vor eine

Reihe rechtlicher und ethischer Fragen, da entsprechende Technologien häufig über amerikanische Rechenzentren betrieben werden und dadurch Schülerdaten möglicherweise an Dritte ausgehändigt werden. Lokal betriebene Open Source-Alternativen in bestehende Infrastrukturen zu integrieren scheint die plausibelste Lösung, wobei die Frage der Integration und Instandhaltung durch geschultes Personal gerade im deutschen Raum oft ungelöst bleibt. Eine ordentliche Integration vorausgesetzt, können *Shared Documents*-Technologien eine wertvolle Bereicherung für *Blended Learning* Konzepte sein. Da *Shared Documents*-Tools sowohl synchrone als auch asynchrone Nutzung ermöglichen, können sie als Brücke zwischen Unterrichtsaktivitäten und Heimphasen agieren und diese beiden Phasen miteinander verbinden. *Shared documents* zeichnen zudem Lerneraktivitäten verschriftlich auf und machen so Lernprozesse nicht nur untersuchbar, sondern den Erarbeitungsprozess bei der Aufgabenbewältigung auch bewertbar. Eine prozessorientierte Bewertung von Schülerleistungen erscheint gerade bei in Gruppen zu lösenden Aufgaben sinnvoll, obgleich diese auch viele Fragen aufwirft (z.B. hinsichtlich der Gewichtung von prozess- und produktorientierter Bewertung). Aus Methodensicht erwiesen sich *Shared documents*-Tools zwar als ein verhältnismäßig einfaches Werkzeug zur Datenerhebung von Lernprozessen, doch viele Informationen wie Klick- oder Leseverhalten der Teilnehmer/-innen gingen durch das gewählte Datenerhebungsverfahren verloren. Verfahren wie Eye-Tracking oder Screenrecording könnten die in *Google Docs* gesammelten Daten sinnvoll ergänzen, um spezifische Aspekte synchroner kollaborativer Texterstellung umfassender zu erklären. Schließlich machten die verschiedenen Nutzerpräferenzen und der unterschiedliche Aufgabenerfolg der Gruppen deutlich, dass neue Arten der Zusammenarbeit auch entsprechender Instruktion bedürfen.

Abstract

This study explored the process of synchronous collaborative L2 writing using *Google Docs* in an English for medical purposes setting at university level. The research design is qualitative in nature as the collaborative practices of 24 German medical students in eight groups of three were investigated. The study focussed on the (approximately) 45-50 minutes long collaborative writing process of the eight groups with respect to their negotiation of the collaborative process. In other words, how did the students use *Google Docs* synchronously in terms of channel usage? What aspects of the collaborative task did those groups of L2 students decide to make a subject of discussion and what does that tell us about the nature of the process? Finally, how did students experience this synchronous collaborative writing process? The data collection relied primarily on the built-in recording features of *Google Docs*. The resulting data (chat logs, revision history of the co-authored texts, comments history) was compiled into a chronologically organised data set. In addition, participants took part in a post-activity survey. The participants' collaborative practices and their answers in the survey were analysed utilising a qualitative content analysis approach.

The results of the analysis revealed three major findings: First, students participated very actively in the activity, resulting in many opportunities for creating and negotiating language output – a necessary condition for second language development. Students focussed primarily on content- and workflow-related discussions, which is in line with findings from collaborative writing research. Students also engaged in 'linguaging', i.e. language-related metatalk, which raises their language awareness – another facilitator of second language development. Due to the computer-mediated nature of the student discourse and the students' high language level, surface-level matters like layout or spelling were not discussed by the students. Second, the analysis of discussion episodes revealed that the participants verbalised certain aspects of the writing process in their task-related meta discussions. An initial peak in workflow- and content-related discussions resembled a planning phase, the following rise in language- and structure-related discussions represented the translating phase. The final

phase, which resembled a revision phase, saw a decrease of all discussions. Third, it had been hoped that two distinct patterns of solving a task together, namely collaboration and cooperation, could be identified by investigating instances of synchronous channel usage. However, synchronous activity in the text or overlap of activity in the chat and text did not prove to be a reliable indicator of either pattern. Due to the synchronous and all-written nature of the activity, it seemed plausible to classify synchronous collaborative writing as collaboration by default. The analysis also revealed a negative correlation between chat activity and performance in the final text. Groups who performed worst in the final texts dedicated substantially more time to chatting (about content- and workflow-related matters) than more successful groups. These groups seemed to struggle to establish a common content and workflow understanding, which is further supported by the post-activity survey. An all-written, multi-modal environment proved to be a challenge for some students, who could have benefitted from pedagogical guidance.

The exploratory investigation of the synchronous collaborative L2 writing process with *Google Docs* led to several implications for foreign language teaching and research. First, the implementation of web-based technology can pose a serious legal and ethical challenge for educators and researchers in Germany, in particular, as user data is surrendered to global cloud-based systems – a problem which can only be solved by relying on locally installed, open source software. Second, shared documents can be a powerful tool to bridge the gap between classroom activities and the online component in blended learning settings. Third, shared documents make learning processes visible and, hence, assessable – albeit a shift from a product-oriented to a process-oriented assessment approach poses several pedagogical and pragmatic challenges. Fourth, shared documents is a feasible way for educators to collect user data for research but could benefit from the inclusion of more sophisticated means of data collection, such as eye-tracking or screen recording. Finally, the exploratory setup of this study revealed that a new way of working together requires guidelines on how to best exploit the

possibilities of shared documents technology to work collaboratively on a joint project – a valuable avenue for future research.

1 Introduction

“[Technology has] migrated from the far fringes of the culture to the absolute center as mobile technology created a new generation of digital consumers. Now, we live in a dazzling world of screens that has ushered in revolutions in media, transportation, and science. The future is arriving faster than ever” (The Verge 2017).

Technology has always been a changing force in our lives, information technology in particular, as the quote from the very influential US technology-blog-gone-internet-culture-magazine *The Verge* indicates. The information that technology enables us to carry in the palms of our hands today would have required computers the size of apartment buildings a few decades ago. Technology is also changing everything around us: “Technology isn't all about bits and processors. It's the car with no driver, human organs printed in a lab and leisurely flights into space” (Engadget 2017).

Early on, academic scholars, including in the educational field, realised technology's transformational capabilities in all areas of human life. This led Mark Prensky to coin his (in)famous term, the “digital natives”:

“[They] are used to receiving information really fast. They like to parallel process and multi-task. They prefer their graphics before their text rather than the opposite. They prefer random access (like hypertext). They function best when networked” (Prensky 2001).

Prensky claimed that the generation growing up in the era of information technology should be considered ‘digital natives’ as opposed to ‘digital immigrants’ who were born before the advent of the personal computer and the internet. “[...][However] to label an entire generation ‘digital natives’ is a bold declaration indeed” (McCarthy 2010: 730). As promising as it sounds to be ‘born into the digital realm’, common sense and experience have shown that being born after a certain date does not make anyone ‘digitally literate’. In fact, ‘being good with a computer’ (a basic notion of computer literacy), i.e. able to switch on the computer, navigate with a keyboard and mouse and carry out basic tasks in *Microsoft Word*, does not suffice in an age of news distribution based on algorithms (*Facebook's* news feed) and voice-activated shopping assistants (*Amazon's Echo* speaker with the digital assistant called ‘Alexa’). The current trend is to not speak of isolated ‘skills’ but of more

complex 'literacies' (cf. Hallet 2013: 68), which becomes apparent in Mark Warschauer's notion of "electronic literacy": Basic classroom skills like reading, speaking, and writing become more complex through the adoption of digital technology. Reading becomes researching as 'texts' are interconnected through the internet and 'speaking' becomes a vast array of technology-mediated, at times hybrid forms of oral/written interaction (cf. Shetzer and Warschauer 2000: 177). Writing becomes 'construction':

"Construction more or less corresponds to what would be considered "writing" in traditional pedagogy. However, the term "construction" is used to designate three important shifts: (1) from essay to hypertext, (2) from words to multimedia, and (3) from author to co-constructor" (ibid.: 174).

The third shift "from author to co-constructor" points towards another development of the last decade: Web 2.0. The second generation of the internet, the participative web, the social web, or web 2.0 refers to "[...] the evolution of the Web, which has now become more open, personalized, participative and social. [...] [It] has become more powerful and widely accessible for all and for most of the time" (Ravenscroft 2009: 415). Hence, internet users have evolved from mere content consumers into content contributors and creators. Technology has become more accessible both in terms of user interfaces and cost, empowering more people to create rather than just consume. Consequently, competent web 2.0 users need a complex set of skills and literacies:

"On the more cognitive side, Web 2.0 invites users to develop confidence in new modes of inquiry and new forms of literacy. [...] On the more social side, effective Web 2.0 users must be comfortable with collaborative modes of engagement. They must also welcome new opportunities for publication on the internet and the audience attention that this entails." (Crook 2008: 4)

Not only are our lives engulfed in a digital revolution, but we as educators also have the responsibility to both create opportunities for learning in this environment and to prepare our students to thrive in an era of digital transformation. As implied earlier, this digital transformation is having a major impact on language too: "The Internet is the largest area of language development we have seen in our lifetimes. Only two things are certain: it is not going to go away, and it is going to get larger" (Crystal 2011: 149). One of

these changes is the huge shift towards written interaction both synchronous and asynchronous by means of technology. “[...] [U]ntil the advent of the Internet, there was no readily available means of exchanging written messages with sufficient speed and reliability to earn them the designation ‘conversations’” (Herring 2013: 248). Computer-mediated communication is hybrid in nature, i.e. it shows characteristics of both oral interaction and writing. As a consequence, the classic dichotomy ‘oral speech production is dynamic – written production is static’ (Yates 1998: 33) does not hold true anymore. When applied to the classroom, this interface of technology, communication, culture, and language also transforms teaching when applied to the classroom: “Educational technologies become more than simply an independent variable in a study of student learning. Integrating technologies into the classroom leads to substantial changes in social organization, student-teacher relationships, and a myriad of other [changes] [...]” (Amiel and Reeves 2008: 35).

It is exactly at this intersection that this exploratory research study is situated. Although new gadgets, toys, and tools are constantly emerging and entering the pedagogical discourse, technologies with the potential to truly transform teaching practices are rare. In fact, most technologies have no transformational potential by themselves. It is pedagogically-motivated, sound implementation of technologies in existing teaching paradigms which will transform our classroom practice. Showing a *YouTube* film in-class is no different than playing a VHS video in the 1980s. Having students create videos themselves using web 2.0 technologies, however, is a different story. The same holds true for collaboration: Students working together on a joint effort is, from a communicative language teaching point of view, nothing new. However, facilitating synchronous written collaboration is virtually impossible without web-based information technology. Only one person can write on a sheet of paper at any given time. And while doing so, the writer obstructs the view of what he or she is writing and blocks access to the document for others. Even if students were to create a piece of writing together in front of one computer, one person would end up typing in the text and the others would take on a subsidiary role – the ‘tools’ of collaboration

are distributed unequally in an offline setting. Such an arrangement only caters for in-class/synchronous collaboration. If students were to continue their group project out-of-class, they would have to somehow get access to the joint document. Such ‘feasibility’ considerations – often neglected in educational research – can ultimately spoil a good teaching impulse. This is where *shared documents technology* comes in, facilitating both synchronous and asynchronous collaboration through a web-based word processing interface. Tools like *Microsoft Word Online* or *Google Docs* enable collaboration across devices and allow users to edit text synchronously, i.e. at the very same time. Users can literally see their peers’ individual letters flying into the document as they type and observe their fellow collaborators’ clicking behaviour. This creates an interactive, highly transparent (hence available for investigation), and at times seemingly chaotic writing practice which can truly transform what ‘writing a text together’ means.

The aim of this study is to explore this process of synchronous collaborative L2 writing using *Google Docs* in an English for medical purposes setting at university level. The research design is qualitative in nature as the collaborative practices of 24 German medical students in eight groups of three are investigated. The implementation of the writing task into the course concept is reflected, yet not at the centre of attention. The study focusses on the (approximately) 45-50 minutes long collaborative writing process of the eight groups with respect to their negotiation of the collaborative process. In other words, how did they use *Google Docs* synchronously in terms of channel usage? (Apart from the obligatory text section there is a group chat and a comments feature.) What aspects of the collaborative task did those groups of L2 students decide to make a subject of discussion and what does that tell us about the nature of the process? Finally, how did students experience this synchronous collaborative writing process and what does that tell us about the aforementioned questions? The title of the thesis, ‘Collaborative L2 writing with technology – Interaction and learning’, dictates and reflects the theoretical aspects to be discussed: interaction, collaboration, language acquisition, technology – and their role in language learning. The methodological approach to answering the exploratory research questions

focusses primarily on qualitative content analysis. Finally, the results of the qualitative analysis will lead to implications for teachers, researchers, and theorists, hopefully instigating meaningful discourse and further research in the exciting field of computer-mediated collaboration in the language classroom.

2 Theoretical background

The aim of this chapter is to lay the theoretical groundwork for the empirical part of this thesis; this basis shall both provide relevant constructs for the data analysis and serve as a transparency for interpreting the findings thereof. The title of the thesis constitutes the four relevant strands of the theoretical basis and the order in which they are dealt with: “Synchronous collaborative L2 writing with technology – Interaction and Learning”. Hence, the theoretical part of this thesis contains the following main chapters:

- The SLA perspective: Interaction and learning
- The L2 writing process
- The pedagogical perspective: Task-based language teaching
- Computer-mediated collaborative writing

The first two chapters establish the two key principles of collaborative writing: Interaction and writing. Hence, the first chapter covers two fundamental second language acquisition perspectives one can take when looking at interactive and collaborative practices in the language classroom: a cognitive and a socio-cognitive one. The second chapter deals with the phenomenon of (L2) writing, in particular, two well-established models of the writing process and the main strands of L2 writing instruction research. The importance of interaction for language development and writing as a vehicle for learning processes translate well into a classroom-related concept like task-based language teaching (chapter three), an offshoot of communicative language teaching, which focusses heavily on creating meaningful opportunities for learner interaction in order to achieve communicative competence. The fourth chapter introduces technology into the equation, i.e. basic considerations regarding computer-mediated communication, the origins of wiki pedagogy and, most importantly, the new phenomenon of shared documents technology capable of synchronous collaboration. The final chapter gives insight into current research on interactive L2 writing with technology, establishing clear-cut research needs and deducing the research questions for this thesis.

The four theoretical perspectives chosen and the order they are presented in are deliberate: The author’s main interest lies in the

synchronous interactive nature of this new way of working together and its applicability to L2 classrooms. 'Writing' as such is seen rather as a vessel for creating opportunities for students to interact rather than the prime focus of this study. Also, this thesis focusses on the interactive process of collaboration rather than its outcome (i.e. the text); as a consequence, the textual qualities of the product are of subsidiary interest. Finally, the technology dimension of the topic is treated last for two reasons: On the one hand, all the aforementioned concepts inform technology-mediated collaborative writing and it makes sense to look into related research after all relevant theoretical concepts have been established. On the other hand, technology is considered 'just a tool'. Although synchronous interactive L2 writing is only feasible through shared documents capable of synchronous collaboration, it is just the means to facilitate a (hopefully) pedagogically sound concept, not the starting point – as should be true for all technology use in the classroom.

A few words on terminology: Instead of putting a series of definitions at the beginning of the thesis, relevant terminological constructs are introduced and discussed throughout. As will be shown, the context is vital to understanding these constructs. Also, when referring to 'theory', expressions like 'theory', 'model', 'hypothesis', or 'construct' are inevitably used. Although these terms are sometimes used inconsistently in the literature, an attempt has been made to stick to Van Patten et al.'s (2015) rather clear-cut distinction, according to which, a (1) theory, being the most comprehensive concept, explains observable phenomena, defines constructs which are investigated, and makes generalizations or predictions (= hypotheses) about these phenomena which can be tested empirically. Models (2), however, do not *explain* but rather *describe* processes related to certain phenomena. In other words, models describe how something works. Theories also explain why something works a certain way. Hypotheses (3) are the result of a theory and are usually ideas about a single phenomenon, rather than a set of phenomena. Hypotheses can be tested empirically (cf. VanPatten and Williams 2015: 1-7). The following chapters draw on all three concepts, and endeavour to respect the aforementioned distinction: theories (e.g. socio-

cultural theory), models (Flower and Hayes' model of the L2 writing process), and hypotheses (Long's interaction hypothesis). Several additional constructs are included (e.g. language-related episodes). Finally, the author has tried to reference to the original texts and ideas about the relevant theories and models discussed here rather than referring to later iterations (and modifications) by other scholars.

2.1 The SLA perspective: Interaction and learning

Collaboration implies people interacting with each other to work on a joint effort. At the same time, interaction between communicators requires collaboration on their part; or, as linguist Paul Grice put it: “Our talk exchanges [...] are characteristically, and to some degree at least, cooperative efforts [...]” (Grice 1975: 45). Therefore, even without a dedicated (e.g. written) product, any (student) interaction can be seen as working together for at least a conversational goal, making “interaction” in essence “collaboration”. That is why Storch’s work on “Collaborative Writing in L2 Classrooms” (2013: 7ff.) and Liddicoat and Scarino’s notion of “two families of theories” have been followed as prevalent paradigms to explain language acquisition and learning (c.f Liddicoat and Scarino 2013: 31ff.). This means a cognitive and socio-cognitive perspective on second language acquisition is taken in this thesis to interpret students’ interactive practices in collaborative writing. The terms ‘acquisition’ and ‘learning’ can imply different ideas about language development:

“[...] SLA (with emphasis on acquisition) is the field of applied linguistics that addresses the question of how language is learned, the word “acquisition” may be interpreted in a traditional sense to refer to view of learning understood only as the gaining of “knowledge” as object or facts, or subject matter, abstracted from context, as opposed to [“learning”] which also [involves] the learner, processes of learning, and situatedness” (ibid.: 31).

Although the author of this thesis is aware of this distinction, the terms ‘learning’ and ‘acquisition’ are used interchangeably, encompassing both the more isolated idea of “gaining of ‘knowledge’” and the more dynamic, context-sensitive concept of learning. Language acquisition and learning is explained by means of the output hypothesis (Swain 1993) and the interaction hypothesis (Long 1996; Long 1983) on the one hand, and socio-cultural theory (Vygotsky 1978) and the concepts of collaborative dialogue and languaging (Swain 2006; Swain and Watanabe 2012) on the other hand.

2.1.1 Cognitive SLA theories: Input, Output, Interaction

“[...] [Cognitive] theories view language acquisition as primarily a cognitive process and thus focus on what triggers learner internal cognitive processes.

These processes include noticing, hypotheses testing and how the mind stores and retrieves information. In these theories, the learner's existing mental capacity is the source of their own learning (Storch 2013: 7)“. As has been explained before, the terms ‘theory’, ‘model’, and ‘hypotheses’ (among other terms) tend to be used inconsistently in the literature (cf. VanPatten and Williams 2015: 1-7). In fact, all three major cognitive ‘theories’ of second language acquisition mentioned in this chapter are ‘hypotheses’: Stephen Krashen’s *input hypothesis*, Merrill Swain’s *pushed output hypothesis*, and Michael Long’s *interaction hypothesis* as well as Richard Schmidt’s *noticing hypothesis*. As will be shown in this chapter, the selection of hypotheses is deliberate as they did not emerge in isolation but were informed and influenced by each other and, arguably, have become key concepts to inform teaching English as a foreign language (TEFL) research.

One of the most influential and controversial ideas on cognitive aspects of second language acquisition of the late 20th century was Stephen Krashen’s *input hypothesis* which considers so-called comprehensible input a primary source for language development; it runs counter to the then prevalent assumption “[...] that we first learn structures, then practice using them in communication, and this is how fluency develops. The input hypothesis states the opposite [...]” (Krashen 1982: 21):

“The input hypothesis makes the following claim: a necessary (but not sufficient) condition to move from stage i to stage $i + 1$ is that the acquirer understand input that contains $i + 1$, where “understand” means that the acquirer is focussed on the meaning and not the form of the message. We acquire, in other words, only when we understand language that contains structure that is “a little beyond” where we are now. How is this possible? How can we understand language that contains structures that we have not yet acquired? The answer to this apparent paradox is that we use more than our linguistic competence to help us understand. We also use context, our knowledge of the world, our extra-linguistic information to help us understand language directed at us” (ibid.).

Krashen makes basically two claims here: The learner focusses on meaning rather than on form; and in order to achieve some understanding of that meaning, the message must be only slightly outside the learner’s knowledge comfort zone ($i+1$). Extra-linguistic clues then facilitate the meaning making process on the part of the learner. According to this school of thought,

productive language capabilities will emerge automatically over time: “The best way, and perhaps the only way, to teach speaking, according to this view, is simply to provide comprehensible input. Early speech will come when the acquirer feels “ready”; this state of readiness arrives at somewhat different times for different people, however. Early speech, moreover, is typically not grammatically accurate. Accuracy develops over time as the acquirer hears and understands more input” (ibid.: 22). Output, according to Krashen, is only an instrument to provide comprehensible input (cf. Swain 1985: 248). Although these hypotheses have gained sufficient attention and created a robust fellowship, many scholars would not accept the negligence of communicative or productive aspects of language as necessary conditions for language development.

While the role of comprehensible input for language development was widely accepted, some researchers entertained great doubts about whether comprehensible input can be considered the sole or primary condition for second language acquisition. In her work on communicative competence, Merrill Swain investigated the development of communicative competence across three dimensions (grammar, discourse, socio-linguistic) in English-speaking French students in a French (as a second language) immersion program “relating [the students’] [...] output at a macro level to their language learning environment” and comparing it to the language ability of French native speakers (Swain 1985: 236). After seven years of (arguably) comprehensible input, the immersion learners did *not* display native-like grammatical competence¹, which led Swain to question the role of comprehensible input as the only or primary condition for language development: “Thus it is possible to comprehend input - to get the message - without a syntactic analysis of that input. [...] This could explain the phenomenon of individuals who can understand a language and yet can only produce limited utterances in it. They have just never gotten to a syntactic analysis of the language because there has been no demand on them to

¹ “Native-like” communicative competence the primary goal of communicative language teaching is characteristic of the time. Byram’s concept of the intercultural speaker as a model (rather than the native speaker) had not been introduced at the time. Communicative competence will be dealt with in chapter 2.3.1 Intercultural communicative competence.

produce the language" (ibid.: 249). According to Swain, it is the lack of comprehensible output which explains the lack of grammatical competence in her participant group. "[Students] have developed [...] strategies for getting their meaning across which are adequate for [...] [being] understood by their teachers and peers. [...] [There] is no push for them to analyze further the grammar of the target language because their current output appears to succeed in conveying their intended message" (ibid.). This observation has become known as the *output hypothesis*, according to which, language production has three main functions which are beneficial for second language development: producing output can make learners notice gaps in their linguistic knowledge, provide a test environment for learners' hypotheses about language; finally, "using the language, as opposed to simply comprehending the language, may force the learner to move from semantic processing to syntactic processing", hence transitioning from mere focus on meaning to focus on form as well (Swain 1985: 249). Swain's subsequent work elaborated on the importance of pushing students to not just go for the gist (meaning) but challenge them to reflect on their language and strive for excellence: "Learners need to be pushed to make use of their resources; they need to have their linguistic abilities stretched to their fullest; they need to reflect on their output and consider ways of modifying it to enhance comprehensibility, appropriateness and accuracy. This can be accomplished both through teacher-led and collaboratively structured sessions" (Swain 1993: 160–161). Her call for teacher invention by means of pedagogical concepts to create a meaningful environment for pushed output to happen can be considered a conceptual precursor for task-based approaches to language teaching as it stresses the importance of the underlying task configuration.

Michael Long, investigating conversations between native speakers and non-native speakers, added the notion of interaction to the discussion of the role of comprehensible input for second language acquisition. "Interaction, simply put, refers to the conversations that learners participate in" (Gass and Mackey 2015: 183). Long argued that "[...] [SLA research] often conflates two related but distinguishable phenomena: input to, and

interaction with a language acquirer. [...] When describing linguistic input, therefore, we are considering only the forms that the learner hears; analysis of interaction means describing the functions of those forms in (conversational) discourse" (Long 1983: 127). This distinction is important when investigating ways to make input comprehensible as native speakers not only, e.g. simplify their language (i.e. change the nature of the input) when talking to non-native speakers but also modify the conversational structure (i.e. change interactional patterns) of the discourse in order to be understood by the non-native speakers. Native speakers do so in order "[...] (1) to avoid conversational trouble, and (2) to repair the discourse when trouble occurs" (ibid.: 131). Native speakers apply a number of strategies and tactics to facilitate these two goals, e.g. they "select salient topics" or "request clarification" (cf. Long 1983: 132 ff.). Based on these observations and Krashen's understanding of comprehensible input as key facilitator of second language acquisition, Long made the following very tentative statement, which is often referred to as the first version of his famous *interaction hypothesis*: "If one accepts that there is already substantial evidence of a second causal relationship between comprehensible input and SLA, then one can deduce the existence of an *indirect causal relationship between linguistic and conversational adjustments and SLA*" (Long 1985: 388). In other words, native speakers' linguistic and conversational adjustments during interactions with (linguistically less competent) non-native speakers create opportunities for language development.

In his revised version of the *interaction hypothesis*, Michael Long acknowledged the fact "that comprehensible input alone is insufficient" in order to develop certain aspects of linguistic competence (Long 1996: 423); in line with Swain's claim that learners need to reflect on the language they are producing and that they cannot do so automatically while focussing on meaning (cf. Swain 1985: 248), Long points out the necessity of attention, awareness, and focus on form for second language acquisition: "On this account, failure to learn is due either to insufficient exposure or to failure to notice the items in question, even if exposure occurred and the learner was attending" (Long 1996: 427). The terminological field of attention,

awareness, and focus on form is a complicated one. In her work on noticing in L2 writing, Geist provides a comprehensive overview of the terminological spectrum (cf. Geist 2013: 21 ff.). She uses “language awareness” as an umbrella term and overall goal in language development, encompassing several concepts such as attention, consciousness, (meta-)linguistic awareness etc.:

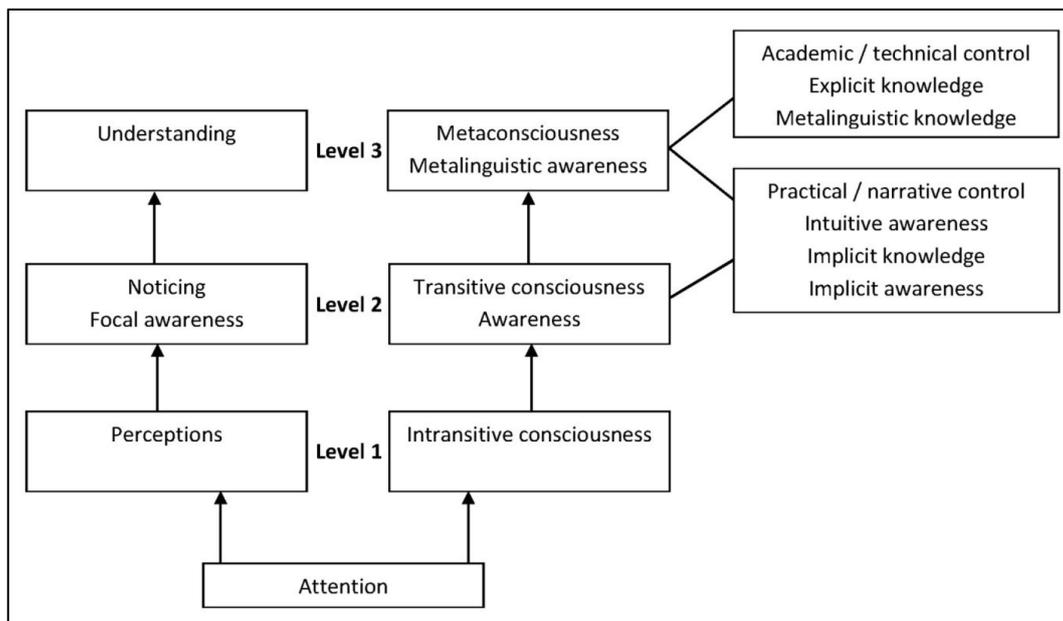


Figure 1: An overview of the terminology used in the research field of linguistic awareness and consciousness (Geist 2013: 25).

Geist displays three levels of attention to language, including both Schmidt’s terminology (Schmidt 1990) on the left and van Lier’s terminology (van Lier 1998) on the right; the first level of attention basically refers to the human capacity of perceiving input, yet without intended or conscious attention to this input. Implicit learning can but by no means has to take place at this stage. In the second stage, input is not only perceived but also noticed. Here is where Schmidt’s *noticing hypothesis* becomes apparent, stating [...] that what learners notice in input is what becomes intake for learning” (Schmidt 1995: 20). “Consciousness is thus the presupposition of awareness. Language awareness can be situated on this level or one level further², on the level of *metaconsciousness*. This level involves knowledge about mental processes and the ability to communicate this knowledge, and it roughly corresponds to

Schmidt's Level 3 noticing" (Geist 2013: 26)³. In his updated version of the interaction hypothesis, Michael Long acknowledges the key role of noticing in language acquisition:

"[N]egotiation for meaning, and especially negotiation work that triggers interactional adjustments by the NS or more competent interlocutor, facilitates acquisition because it connects input, internal learner capacities, particularly selective attention, and output in productive ways. Negotiation for meaning by definition involves denser than usual frequencies of semantically contingent speech of various kinds (i.e., utterances by a competent speaker, such as repetitions, extensions, reformulations, rephrasings, expansions and recasts), which immediately follow learner utterances and maintain reference to their meaning" (Long 1996: 451–452).

In its evolved form, the *interaction hypothesis* stresses the importance of both comprehensible input and output; input, learner competence ("internal learner capacities, particularly selective attention"), and learner performance ("output") are interconnected by means of interaction. As the interaction practices involve "denser than usual frequencies" of language-related talk, they facilitate a focus on language form, a much required 'push' in order to get learners to "[...] to reflect on their output and consider ways of modifying it to enhance comprehensibility, appropriateness and accuracy" (Swain 1993: 160–161). It is also worth noting that Long has broadened the applicability of his hypothesis by not only talking about native speaker-non-native-speaker-interaction but including the notion of a "more competent interlocutor". This subtle addition makes the hypothesis applicable for TEFL classroom contexts where students rarely interact with native speakers but with their peers who can, in different aspects of the English language, be more or less competent: "[...] [L]earners engaging in conversation will create an ideal situation for L2 learning when some misunderstanding arises and the speaker and the interlocutor negotiate for meaning" (Yanguas 2010: 74). As a consequence, the roles of native speaker or more competent interlocutor and L2 learners become fluid.

³ As Geist's deliberations suggest, language awareness (and related concepts) should be seen as a continuum ranging from unconscious perception (and, hence, implicit learning as a consequence) to completely conscious forms of attention (i.e. explicit learning). Although this thesis focusses on more explicitly demonstrated acts of learner activity, it acknowledges the existence and importance of implicit forms of learning.

2.1.2 Socio-cognitive SLA theories: Social learning

The second SLA perspective which is commonly taken when looking at collaborative or interactive practices in teaching is a socio-cognitive one. From such a perspective, "[interaction] [...] is viewed [as] more than just the means to make input comprehensible or as an opportunity to provide negative feedback and for modified output. Rather [...] interaction and the use of language in interaction play a key role in all cognitive development, including language learning" (Storch 2013: 13). Hence, this chapter showcases the basic features of the so-called *socio-cultural theory of learning* of Lev S. Vygotsky, its key terms, and its application in language teaching, primarily by Merrill Swain.

In order to understand the origins of Vygotsky's concept, some context has to be provided: The soviet psychologist Lev Vygotsky, with an interest in developmental psychology, challenged the basic notion that child development and learning are two separate, non-related concepts (e.g. Vygotsky 1981). In his contribution "Interaction Between Learning and Development", he rejected the three prevalent research positions in developmental psychology:

1. "Learning [as] a purely external process that is not actively involved in development. It merely utilizes the achievements of development rather than providing an impetus for modifying its course".
2. "[L]earning is development. [D]evelopment is viewed as the mastery of conditioned reflexes; that is, the process of learning is completely and inseparably blended with the process of development".
3. A combination of position one and two: "On the one hand is maturation, which depends directly on the development of the nervous system; on the other hand is learning, which itself is also a developmental process" (Vygotsky 1978: 34-36).

According to these positions, learning and development are either two separate, distinct entities which do not relate to each other (1), the same thing in a behavioural/Skinner approach (2), or two separate things which exist simultaneously but do not interact with each other (3).

Vygotsky called for a new approach: the so-called *zone of proximal development*. Vygotsky starts off with a "well known and empirically

established fact”: “[...] learning should be matched in some manner with the child's developmental level”. The child's “actual developmental level” is identified by a series of tests and “it is generally assumed that only those things that children can do on their own are indicative of mental abilities”. Vygotsky demonstrates that this notion of development, only taking the actual development into consideration, is problematic in describing a person's developmental stage by means of an example: Two ten-year-old children are tested and display the mental capacity of an eight-year old child, i.e. they “can independently deal with tasks up to the degree of difficulty that has been standardized for the eight-year-old level”. Traditional research, he argues, would stop at this stage and state that these children have the same mental capacity (Vygotsky 1978: 37). He suggests beginning the experiment (not ending it) at this point by presenting the children with a problem just beyond their mental development and providing some sort of teacher / adult support to the children, e.g. by showing the child how to solve the problem and asking them to imitate it or by offering leading questions. He then proposes that both children manage to deal with a problem beyond their developmental stage by guidance, yet “the first child can deal with problems up to a twelve-year-old's level, the second up to a nine-year-old's”. This shows, he argues, that their “actual development” might be the same, but their potential development is not, which is why it has to be considered a second dimension in assessing a child's developmental level:

"This difference between twelve and eight, or between nine and eight, is what we call the zone of proximal development. It is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (ibid.: 38).

This discovery comes with profound implications for learning and teaching and a rethinking of the role of imitation in learning: “Children can imitate a variety of actions that go well beyond the limits of their own capabilities. Using imitation, children are capable of doing much more in collective activity or under the guidance of adults” (Vygotsky 1978: 39). Learning which is geared towards already completed development is deemed

ineffective as it lags behind the child's development. In other words, by presenting learners with problems just beyond their capabilities and offering some sort of guidance, we create ideal conditions for learning. This guidance, of course, does not have to be a teacher or adult. By working together on a problem, learners can act as guides for each other and, as a consequence, become capable of solving problems which they as individuals could not. This idea of mental development through interaction with others (which also implies collaboration) is where the 'socio-cultural' aspect of the theory surfaces. But what does this mean for learning?

"SCT⁴ researchers describe a developmentally sequenced shift in the locus of control of human activity as object-, other- and self-regulation. Object-regulation describes instances when artefacts in the environment afford cognition/activity, such as the use of an online translation tool to look up unknown words while reading or writing [...]. Other-regulation describes mediation by people and can include explicit or implicit feedback on grammatical form, corrective comments on writing assignments, or guidance from an expert or teacher. [...] Self-regulation refers to individuals who have internalized external forms of mediation for the execution or completion of a task" (Lantolf et al. 2015: 209).

In other words, cognitive development originates in interaction (be it object-oriented interaction or social interaction) and shifts towards an internal mediation capacity in the learner. This process is called internalisation "[...] whereby humans gain the capacity to perform complex cognitive and physical-motor functions with progressively decreasing reliance on external mediation and increasing reliance on internal mediation" (ibid.: 211–212).

The socio-cultural theory of learning is not geared towards language learning specifically but has informed language learning research to a great extent:

"[...] [A] sociocultural view of learning links [...] [the] concept [of the ZPD] to the role of collaborative interaction in task accomplishment, a process known as scaffolding⁵. Through scaffolding, learners create zones of proximal development involving collaborative dialogue in which a more knowledgeable interlocutor⁶ assists a learner in

⁴ Socio-cultural theory.

⁵ "Scaffolding, unlike the ZPD, is thought of in terms of the amount of assistance provided by the expert to the novice rather than in terms of the quality, and changes in the quality, of mediation that is negotiated between expert and novice [...]" (Lantolf et al. 2015: 214).

⁶ "[P]eers can simultaneously be experts and novices and thus are able to provide scaffolded assistance to each other" (Swain and Watanabe 2012: 3).

performing an activity they could not complete unaided [...]. This process creates the conditions where L2 development can occur" (Peterson 2010: 44).

One of the more prominent educational researchers taking a socio-cultural stance on language learning is the aforementioned Merrill Swain (the *output hypothesis*). In her continuing quest to investigate productive language activities as a factor in language development, she found that output-oriented activities foster noticing of language features and hence language development takes place (cf. Swain 1998: 67). She also made the interesting observation that "much of what is observed in metatalk when learners are faced with a challenging language production task and are encouraged to talk about the problems they encounter in doing the task should help us to understand language learning processes" (Swain 1998: 69). In other words, what she calls *metatalk* makes learning processes visible for teachers, researchers, and, most importantly, for learners themselves. "Thus, by encouraging metatalk among second and foreign language students, we may be helping students to make use of second language acquisition processes" (ibid.). Such *metatalk* then has a double function: making learning visible and making learning possible. Instances of such language-related metatalk are called *language-related episodes*: "A *language-related episode* is defined as any part of a dialogue in which students talk about the language they are producing, question their language use, or other- or self-correct" (ibid.: 70). In Swain and Lapkin's work on "Interaction and Second language learning", they formulate it even more clearly: "Dialogue provides both the occasion for language learning and the evidence for it. Language is both process and product" (Swain and Lapkin 1998: 320). They even claim that dialogue as "[...] the window into intramental processing is more transparent than the window provided through introspective techniques" (ibid.: 322), a highly provocative statement as it openly questions the effectiveness of introspective methods like think-aloud protocols. They reinforce these claims by study insights indicating "that similar mental processes are at work in joint activity and in individual activity when individuals from the same population respond to the same task" (ibid.). Although this seems more than plausible, the mere existence of one or more peers creates more

conversational opportunities than just making thought processes of individuals visible. Small talk, disagreement through arguments an individual student was not prepared to make, etc. are bound to emerge. Consequently, a conversation among several participants might provide similar insights into people's mental processes but a 'real' conversation between two or more people is bound to take a different direction than the private speech of an individual.

Based on Vygotsky's claims "[...] that higher mental processes find their source in interaction between an individual, others and the artifacts they create [...]" (Swain 2006: 106), Swain continued to investigate the importance of 'talking-it-through' (or *metatalk*, see above) for learning and coined, or rather adopted the term *linguaging*:

"Linguaging [...] refers to the process of making meaning and shaping knowledge and experience through language. It is part of what constitutes learning. Linguaging about language is one of the ways we learn language. This means that the linguaging (the dialogue or private speech) about language that learners engage in takes on new significance. In it, we can observe learners operating on linguistic data and coming to an understanding of previously less well understood material. In linguaging, we see learning taking place" (ibid.: 98).

Swain presents a number of studies which show, by means of pre- and post-tests, that linguaging results in language development (cf. Swain 2006: 99 ff.). What is worth noting is her focus on advanced language learning, following Vygotsky's notion of "higher mental processes" (see above) which makes the practice of engaging in "linguaging about language" particularly worth-while for intermediate to advanced language learners who might have "a well-used pattern of speech that [they do] not want to give up" and only through linguaging are "able to focus on an apparent inconsistency in language usage, reason about it and reconcile it" (Swain 2006: 100 f.). Finally, the concept of *linguaging* as 'talking-it-through' was broadened to include both intra- and interpersonal talk, again in line with socio-cultural ideas about internalisation (cf. Lantolf et al. 2015: 211–212):

"When confronted with a complex problem, we may speak with another person about the problem and how to solve it (collaborative dialogue, interpersonal communication), or we may speak aloud or whisper to ourselves (private speech, intrapersonal communication).

These are two types of languaging. Talking with (or writing to) others and talking with (or writing to) oneself are connected theoretically and in practice. As with any example of languaging, the goal is to solve a complex cognitive problem using language to mediate problem solution" (Swain and Watanabe 2012: 1).

To sum up, a socio-cultural perspective of learning has further increased the relevance of interaction in the EFL classroom as interaction is not only a means to make input more comprehensible and output is not only a way of noticing language gaps (cf. Storch 2013: 7). By engaging in *metatalk* about language, i.e. *languaging*, be it with oneself (*private speech*) or with others (*collaborative dialogue*), learners create opportunities for language learning by helping each other (*scaffolding*) achieve development which could not be achieved individually. By engaging in *private speech* or *collaborative dialogue*, students make their learning processes visible to us. They mediate and learn a language by means of language – a truly unique characteristic of language learning.

2.2 The L2 writing process

"Collaboration means the sharing of labour (co-labour) and thus collaborative writing, in its broadest sense, means the co-authoring of a text by two or more writers" (Storch 2013: 2). The 'writing' aspect of "co-authoring a text" is covered in this chapter. At this point, a caveat is in order: Based on the author's knowledge, there is no dedicated and well-established model or theory of *collaborative* writing. There are many studies in the field of applied linguistics on implementing collaborative writing in teaching contexts (see 2.4 Computer-mediated collaborative writing) with a variety of implications (pedagogical, theoretical etc.), however, there is no well-established theory of *collaborative* writing. As a consequence, this chapter covers ideas about the writing process of individuals. However, as we shall see later on, ideas about the writing process of individuals are, in fact, applicable to describing collaborative writing, granted a certain level of reflection by means of socio-cultural theory (see 2.1.2 Socio-cognitive SLA theories: Social learning). This chapter starts off with the discussion of highly influential theories and models about the writing process. Then, main research avenues taken in L2 instruction are presented.

2.2.1 Models of the L2 writing process

Arguably, there are two 'modes' of language production: speaking and writing. In Geist's comprehensive overview of models on speech production and writing in particular, ideas about how writing works are based on conceptualisations of oral speech production to a large extent (cf. Geist 2013: 16). In the following, the focus is on two models of the writing process: Flower and Hayes' L1 writing model and Zimmermann's L2 writing model.

In their *cognitive process theory of writing*, Flower and Hayes question the paradigm of (then popular) linear stage models of writing:

"[Linear] stage descriptions of writing [...] model the growth of the written product, not the inner process of the person producing it. "Pre-Writing" is the stage before words emerge on paper; "Writing" is the stage in which a product is being produced; and "Re-Writing" is a final reworking of that product. Yet both common sense and research tell us that writers are constantly planning (pre-writing) and revising (re-writing) as they compose (write), not in clean-cut stages. [...] Because stage models take the final product as their

reference point, they offer an inadequate account of the more intimate, moment-by-moment intellectual process of composing. [...] Such models are typically silent on the inner processes of decision and choice" (Flower and Hayes 1981: 367).

In linear descriptions of writing, pre-writing activities, such as planning, writing words on paper, and re-writing activities such as correcting spelling errors, as overt (i.e. investigable) phenomena all revolve around the written product of the text. These phases are considered hierarchical stages, where one stage follows the other. Such a research approach takes an external perspective looking at different drafts of the final product rather than the internal processes involved in producing these products. Unsurprisingly, a process model of writing focusses on the psychological processes, not the product(s):

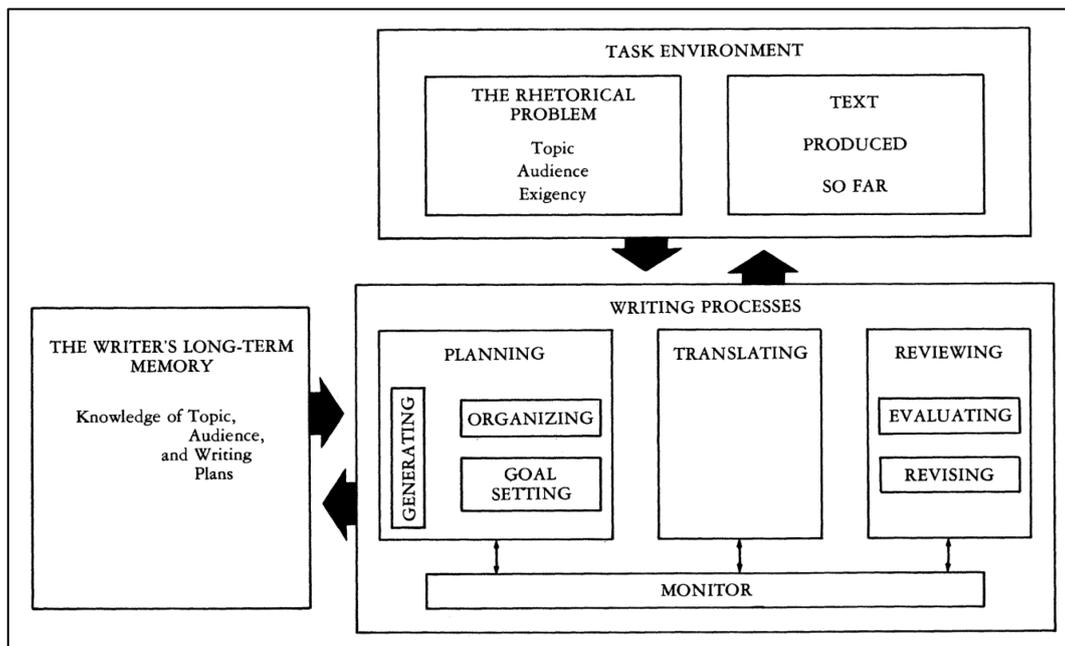


Figure 2: Cognitive process model of writing (ibid.: 370).

There are three dimensions to Flower and Hayes' model: the writing process as such, and two main influencers which form an interactive relationship with the writing process: the writer's long-term memory and the task environment. The writing process consists of three sub-processes: First, there is the "planning" process where "writers form an internal representation of the knowledge" (ibid.: 372) and which encompasses three sub-processes ("generating ideas", "organizing", "goal setting"). Second, there is a "translating" element, i.e. "the process of putting ideas into visible

language” (ibid.: 373). Third, there is “reviewing”, “a conscious process in which writers choose to read what they have written either as a springboard to further translating or with an eye to systematically evaluating and/or revising the text” (ibid.: 374). Finally, the “monitor functions as a writing strategist which determines when the writer moves from one process to the next” (ibid.). Here, two things become apparent: On the one hand, the model is not sequential but hierarchical in nature, i.e. “a large working system such as composing can subsume other less inclusive systems, such as generating ideas, which in turn contain still other systems, and so on” (ibid.: 375). On the other hand, each of the (sub-)processes is interconnected with the two influencers “long-term memory” and “task environment”. During the planning process, for instance, writers may both access their long-term memory when activating topic-related terminology and connect their planning to the task environment by relating their plan to the actual question/topic of the writing activity. Interestingly, the sequence of “planning”, “translating”, and “revising” does in fact resemble a linear or sequential model of writing where one ‘phase’ (here: process) follows the other. Although such a sequence on a very global level of the writing process may exist, the authors emphasise the interconnectedness of the processes: “[...] [People] do not march through these processes in a simple 1, 2, 3 order. Although writers may spend more time in planning at the beginning of a composing session, planning is not a unitary stage, but a distinctive thinking process which writers use over and over during composing” (ibid.: 375). In his contribution on “the psychology of writing”, Ronald Kellogg puts the two seemingly mutually exclusive concepts of writing phases and writing processes into perspective:

“Prewriting, first draft, and subsequent draft phases are merely convenient markers for discussing the evolution of a document from incipient ideas to final product. [...] Within each phase of product development, the writer engages in numerous activities. [...] [T]he term writing process refers to collecting information, planning ideas, translating ideas into text, or reviewing ideas and text [...]. These processes occur repeatedly throughout all phases of writing” (Kellogg 1999: 26–27).

To conclude, both the external (product-oriented) and the internal (process-oriented) perspective on writing have something to offer. Global descriptions of writing phases by referring to certain stages a text goes through do not negate the description of internal, cognitive processes which lead to overt text. They rather pose a different perspective. Particularly in a teaching context, both perspectives matter. Different draft stages document the development of a learner-authored product which can serve an assessment function; writing processes become both visible through the different stages a text goes through and help explain the evolution of that text.

Zimmermann's model of L2 writing is worth mentioning for several reasons. First and foremost, it is geared towards L2 writers (unlike Flower and Hayes' L1 model) with particular interest in L2 writers' problem-solving activities. Second, the model is, in fact, two models: a general model of the L2 writing process, and a more detailed model of the formulation component of the writing process. Third, external factors (like Flower and Hayes' long-term memory and the task environment) are disregarded – yet, not out of disagreement: “We have nothing to add to these aspects” (Zimmermann 2000: 85). Fourth, the two models “focus on the production of individual sentences” (*ibid.*), which accounts for the L2 context where L2 writers are more likely to operate on a micro-level than L1 writers are.

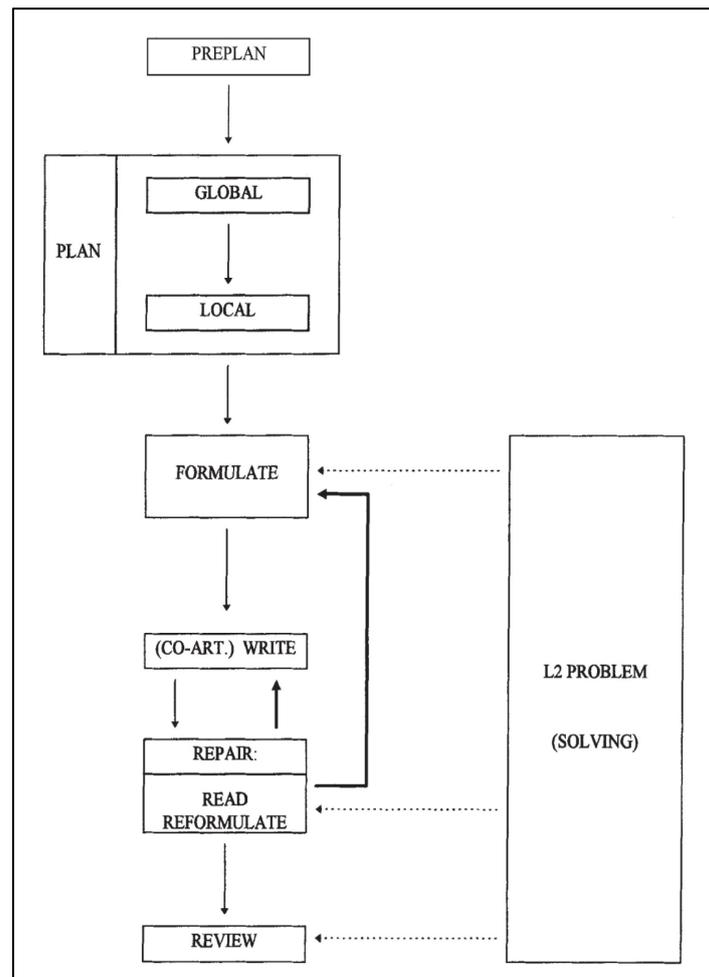


Figure 3: Overall L2 writing model (Zimmermann 2000: 85).

At the very first glance, it becomes apparent that Zimmermann and colleagues suggest a sequence of processes (contrary to Flower and Hayes' interrelated, yet not sequentially ordered processes). This is possible as they “narrow down [their] view to production at the level of individual sentences or shorter paragraphs”. According to Zimmermann and colleagues, certain sub-processes in fact do “seem to have typical “privileged” positions of occurrence” (ibid.: 84) on such a micro-level. Zimmermann's “plan” → “formulate” → “review” sequence does resemble Flower and Hayes' “planning” – “translating” – “reviewing” processes. However, they describe the necessary intermediate step between planning and the physical act of writing in much greater detail by introducing the notion of “formulating”. Key to the formulating component are so-called ‘tentative forms’, “[...] i.e. frequent functional units with formal correlates. This implies that a phrase or a (group of) word(s) only qualifies as a tentative formulation (TENT

FORM), i.e. as a pre-text, if it fits exactly as uttered into the text written so far. Thus a tentative formulation is clearly distinct from just a reflection" (ibid.: 81). The tentative formulations become visible in Zimmermann's think-aloud protocol research design where L2 learners reflect verbatim on their language production. The L2 problem-solving component becomes apparent in their sub-model of the formulating component:

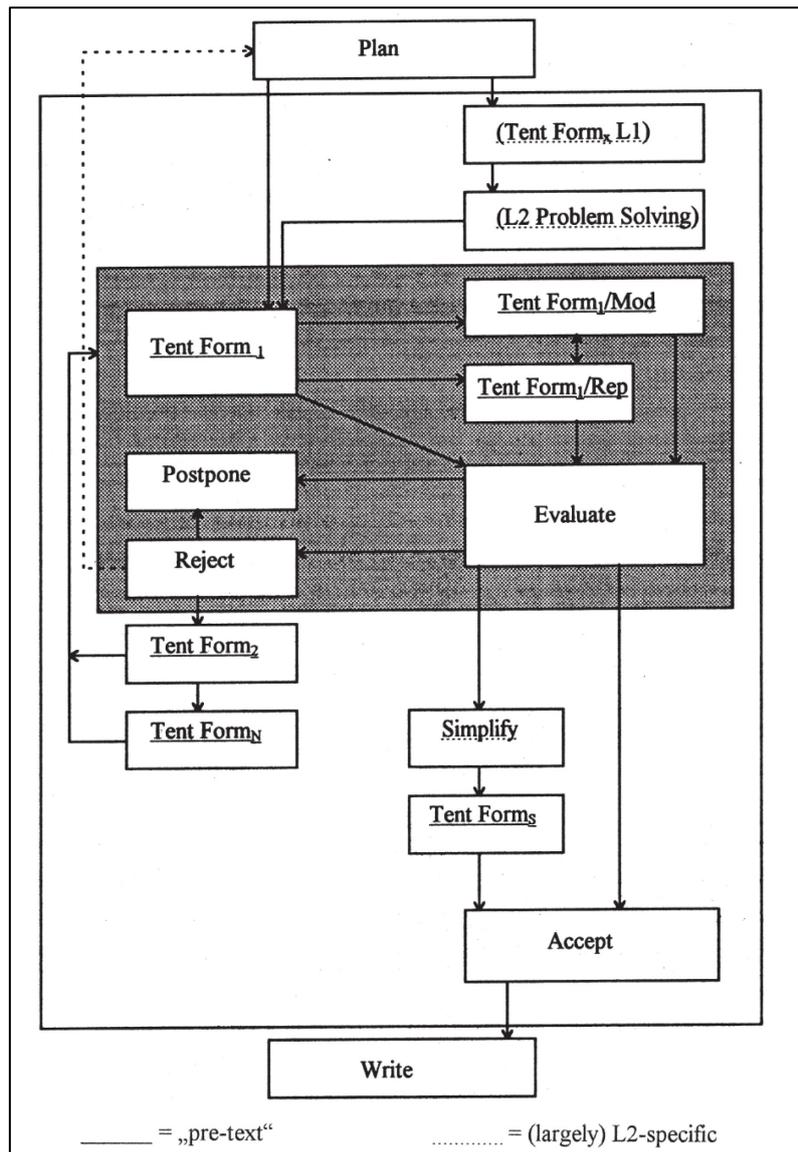


Figure 4: Formulating model (ibid.: 86).

A learner plan results in the creation of either an L1 tentative formulation (which by means of L2 problem solving evolves into an L2 tentative formulation) or an L2 tentative formulation. In possibly a series of evaluative spirals, these tentative formulations either evolve further into modified or

simplified versions until they reach the level of acceptance and are written or rejected (so the process starts all over again) or postponed for later use. Tentative formulations in the L1 and the simplification of tentative formulations are L2-specific as language learners might start with an idea in their L1 or are more likely to reduce the complexity of formulations depending on their language proficiency in the L2.

To conclude, both Flower and Hayes' L1 model of the writing process and Zimmermann's L2 model offer valuable perspectives on the writing process. As Zimmermann basically acknowledges Flower and Hayes' claims about the writing process on a global scale and simply specifies the interim stage between planning and writing as the formulating component ("writing is pre-formulating"; Zimmermann 2000: 84), it could be argued that Zimmermann's model complements (rather than rivals) Flower and Hayes' model with regard to L2 writers on a micro level.

2.2.2 L2 writing instruction

So far, it has been established that, from a second language acquisition point of view, student interaction in the target language has the potential to be facilitative of language development. Although this thesis focusses on the interactive aspect of collaborative writing (as a facilitator of L2 development) rather than the writing itself and its potential benefits for L2 development, brief attention to the pedagogical implications of (individual) L2 writing as a possible site for L2 development is useful. As Manchón points out in her comprehensive overview on L2 writing research, the theoretical frameworks applied to L2 writing as a site for language learning draw upon the same SLA considerations as mentioned in the previous chapter with regard to interaction and learning, i.e. *input hypothesis*, (pushed) *output hypothesis*, *interaction hypothesis* and *noticing hypothesis* (cf. Manchón 2011b: 64-65).

Scholars specialising in L2 writing research differentiate two main dimensions of L2 writing: (1) "the manner in which second and foreign (L2) users learn to express themselves in writing (the learning-to-write dimension, LW), and [...]" (2) "the way in which the engagement with L2 writing tasks and activities can contribute to development in areas other than writing itself (the writing-to-learn dimension), be it content knowledge

(writing-to-learn content, WLC), or language knowledge and skills (writing-to-learn language, WLL)" (Manchón 2011a: 3). Hence, fundamentally, L2 writing is considered either as a focus of learning itself or as a vessel for facilitating other aspects of learning. As this current study investigates the collaborative writing process of L2 learners in a task-based, English for specific purposes setting and tries to relate the interactive practices to insights from second language acquisition and communicative language teaching, a "writing-to-learn" stance is taken by the author. According to Cumming, an L2 learner develops knowledge across three dimensions on both a macro and a micro level when engaged in L2 writing:

	<i>Micro</i>	<i>Macro</i>
<i>Text</i>	Syntax & morphology	Cohesive devices
	Lexis	Text structure
<i>Composing</i>	Searches for words & syntax	Planning
	Attention to ideas & language concurrently	Revising
<i>Context</i>	Individual development	Participate in a discourse community
	Self-image or identity	Social change

Figure 5: "What does a person learn when writing in a second language?" (Cumming 2001: 3).

The three dimensions of "text", "composing", and "context" on two possible levels result in twelve aspects of L2 writing that are both possible areas of research interest and areas of probable L2 learner development. Obviously, a writing activity can tick several of these boxes, yet is likely to focus on some more than others. Two research studies on different aspects of the learning potential of writing (see above), namely syntax and lexis development and revision, shall be presented briefly to illustrate the language learning potential of writing.

In their 2011 exploratory study, Manchón and Roca de Larios investigated the language learning potential of L2 writing (i.e. *writing-to-*

learn language) in an English for academic purposes course at a Spanish university over the course of a year. The course revolved around three major (open-ended) writing tasks with several drafts and feedback loops in-between and a student journal to accompany and document the course experience. The authors investigated the students' perceptions of the language learning potential of writing using multiple data sources, e.g. collected writing materials, language proficiency pre- and post-tests, classroom observation data (etc.). However, their primary source were in-depth semi-structured interviews and the students' self-reflection journals (cf. Manchón and Roca de Larios 2011: 183-188). Both data from the language proficiency pre- and post-test and students' introspections revealed that students improved their language proficiency mainly in terms of grammar and vocabulary over the course of the year – an improvement in the “text” domain on a “micro level” (in Cumming's terms, see Figure 5). According to the students' perceptions, language learning potential is linked to a number of factors:

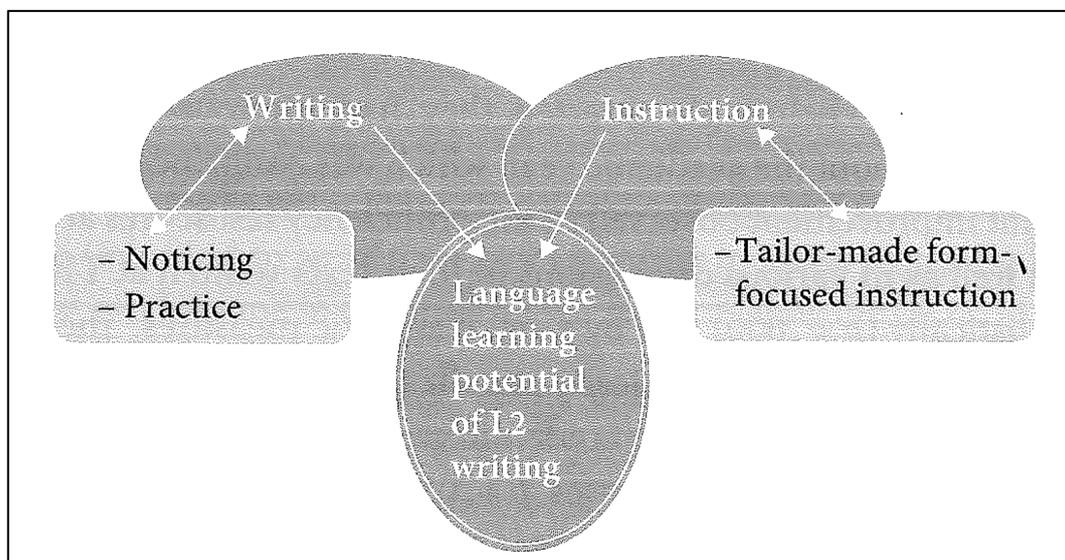


Figure 6: Mediating factors and learning processes related to the writing-to-learn dimension of L2 writing (*ibid.*: 194).

To summarise, both the writing activity (the actual “practice” of writing and instances of noticing certain aspects while writing or via teacher feedback before and after the activity) and form-focussed instruction made up the language learning potential of L2 writing. There is particularly rich data on the perceived importance of noticing: “[...] [The students’] views echoed one

of the main tenets of the Output Hypothesis, according to which the production of challenging output may serve a *noticing function* because L2 users may become aware of the gap between what they know and can do, and what they need to know in order to convey their intended messages successfully" (ibid.: 195). Again, in-line with cognitive SLA theories (cf. 2.1.1 Cognitive SLA theories: Input, Output, Interaction), there is empirical evidence of the importance of language production and selective attention to language features in the creation of opportunities for language development. This focus on language was complemented with corresponding language-focussed instruction which, according to the introspective data, also helped language development (cf. ibid.), eliciting the importance of implementing a task in the greater teaching context.

Another sub-strand of *writing-to-learn* relevant to our current study is *writing-to-learn content (WLC)* which Hirvela defines in the following: "[V]ia such written forms as note taking, organizing outlines, composing summaries, writing in journals, and constructing syntheses, students make sense of the subject matter at hand, and so writing is said to promote learning of content. Writing in these cases operates as a tool for learning while students negotiate meaning and acquire disciplinary knowledge" (Hirvela 2011: 37). In his extensive review of WLC studies, investigating L2 writers' relationship with writing as a tool for learning across many disciplines (education, nursing, architecture, business, physics...), Hirvela comes to the sobering conclusion that only one third of the studies show a strong perception by the students of the concept of writing to learn.

"Perhaps the most important point that emerges from this analysis of the studies discussed in this chapter is that those writers who had the strongest relationship with WLC had received considerable support from their writing instructors as well as their content area instructors, and, again, developed a valuable connection with WLC over time, not quickly" (ibid.: 56). In other words, the content learning potential of a writing-to-learn approach in L2 writing instruction is hard to prove and if there is a positive link, it develops over time. Also, most studies neglect the shift towards computer-mediated writing and its possible impact or as Hirvela puts it: "[T]here is a

need for more research that explores relationships between computer-based literacy and writing in the content areas” (Hirvela 2011: 57).

This glimpse into L2 writing research has shown two aspects: First, from a methodological point of view, there is a strong emphasis on introspective methods revolving around the students’ perceptions of teaching methods. While this surely provides important insights, it seems problematic as the sole method to investigate the efficacy of L2 writing instruction. Second, from a second language acquisition point of view, it has been shown that the same theoretical frameworks which account for language development in student interaction (input, output, interaction) are applicable to the practice of writing. L2 writing as a task in the EFL classroom can therefore be considered a valuable site for language development, particularly so when carried out collaboratively as it adds student interaction to the mix of beneficial conditions for language learning. The perceived affordances of writing for L2 development and the lack of research on computer-mediated writing underline the importance of further research in the field.

2.3 The pedagogical perspective: Task-based language learning

Being able to “[...] to communicate effectively in English” (Hedge 2008: 44) can be considered both a prerequisite and a desirable outcome of collaborative writing in the foreign language classroom. The construct “communicative competence” has not only been the prevalent paradigm in foreign language teaching in the last three to four decades, it is also key to the syllabus and activity design of the language course investigated in this study. Consequently, this chapter is dedicated to introducing communicative competence within its intercultural extension. This then serves as a bridge to emphasise the important role of genuine, relevant tasks as stimuli for student interaction and, hence, language learning.

At this point, another terminological caveat is in order: The author is well aware that there are two basic concepts which refer to teaching a language to non-native speakers of that language: teaching English as a foreign language (TEFL) vs. teaching English as a second language (TESL). The main difference is the classroom context: A TEFL classroom, typically, is situated in a non-English environment where the student cohort is more or less homogenous in terms of their first language and typically have little out-of-class exposure to the English language. As a consequence, students need to be shown the relevance of English by, e.g. providing many instances of target culture input and numerous opportunities to talk in the classroom. A TESL classroom, by contrast, is situated in a context where English is the dominant language and students are from various cultural backgrounds. They share a common motivation, however, as they need to be able to communicate effectively in English in their daily lives in the target culture. As a result, the classroom experience is more likely to be driven by immediate needs of the students in the target culture (cf. Oxford University Press ELT 2011). The literature cited and discussed in the following is likely to refer to only one of the respective teaching contexts or even to an L1 context. Just as with the dichotomy of ‘learning’ vs. ‘acquisition’ (cf. 2.1 The SLA perspective: Interaction and learning), the terminological differences are acknowledged

but the terms ‘English as a second language’ and ‘English as a foreign language’ will co-exist in the following without further discussion.

2.3.1 Intercultural communicative competence

‘Communicative competence’ as the primary goal of language teaching emerged as a concept in the 1970s. Particularly in the German context, the works of Habermas and Piepho have informed a dual notion of communicative competence: First, the ability to communicate appropriately and effectively in a distinct situation on a distinct topic and to understand others. Second, the ability to reflect on language on a meta-level. In the Anglo-American context, the concept of communicative competence also emerged as a result of an increasingly critical attitude towards Noam Chomsky’s notion of ‘competence’, which was criticised for neglecting socio-linguistic factors. Michael Canale and Merrill Swain’s differentiated notion of communicative competence became a paradigm for foreign and second language teaching and even informed the Common European Framework of Reference for Languages (CEFR) (cf. Legutke 2013: 70–71).

Canale and Swain’s concept of communicative competence aims at preparing L2 learners to exploit certain grammatical features in the target language in order to communicate successfully in a number of contexts based on the learners’ needs. In order to do so, learners need a set of competencies: grammatical competence, i.e. “knowledge of lexical items and of rules of morphology, syntax, sentence-grammar semantics, and phonology”, sociolinguistic competence, i.e. “sociocultural rules of use and rules of discourse”, and strategic competence, i.e. “verbal and nonverbal communication strategies that may be called into action to compensate for breakdowns in communication” (Canale and Swain 1980: 29-30). This set of competencies was later extended by a fourth competence, discourse competence (cf. Legutke 2013: 72).

The concept of communicative competence underwent a major change with Byram’s inclusion of the intercultural dimension, which led to the concept of intercultural communicative competence (ICC). He criticised prevalent models of communicative competence to implicitly take the native speaker as a model to aspire to (Byram 1997: 10–11). In fact, Canale and

Swain explicitly mention the native speaker as a model in their concept: "The communicative approach that we envisage is thus an integrative one in which emphasis is on preparing second language learners to exploit [...] those grammatical features of the second language that are selected on the basis of, among other criteria, their grammatical and cognitive complexity, transparency with respect to communicative function, probability of use by native speakers [...]" (Canale and Swain 1980: 29). Byram argues that this glorification of the native speaker is problematic for two reasons: First, assuming that learners and native speakers can achieve the same proficiency level in the target language neglects the fundamentally different conditions under which they acquire the language. Second, such a learning goal (becoming accepted as a native speaker in the target culture) would need the learner to surrender his or her own socio-cultural identity in order to become a native speaker, which is neither possible nor desirable ("linguistic schizophrenia"), even for bilinguals (cf. Byram 1997: 11–12). He therefore makes the case for a new concept:

"Whatever a person's linguistic competence in a foreign language, when they interact socially with someone from a different country, they bring to the situation their knowledge of the world. [...] Their knowledge of their own country is a part of the social identity [...]. The mutual perceptions of the social identities of the interlocutors is a determining factor in the interaction. [...] It will be evident from this that we cannot describe such an interaction as if there were two 'native speakers' [...], one of whom is true native and the other attempting to be so. Yet, [...] this is often the assumption when only the linguistic competence of each is in question[.] [...] It is for this reason that I shall introduce the concept of the 'intercultural speaker' to describe interlocutors involved in intercultural communication and interaction" (ibid.: 31–32).

By including the socio-cultural context of interaction in the notion of communicative competence, one also implies a greater set of requirements for the learner in order to thrive in intercultural communication. Byram calls these influencing factors for intercultural communication "savoirs", i.e. a set of learner skills, knowledge, and attitudes which influence intercultural communication:

- **"Savoirs" = Knowledge:** of self and other; of interaction: individual and societal
- **"Savoir comprendre" = Skills:** interpret and relate

- **"Savoir s'engager" = Education:** political education; critical cultural awareness
- **"Savoir apprendre/faire" = Skills:** discover and/or interact
- **"Savoir être" = Attitudes:** relativising self; value others

(ibid.: 34)

As can be seen from this collection of factors, intercultural communicative competence not only demands communicative ability in a functional sense but also requires the learner to be able to change perspectives, show empathy towards others, question his or her own ethnocentric views, and be open and tolerant towards others (cf. Hu 2013: 76). These "savoirs" interact with the other sub-competences:

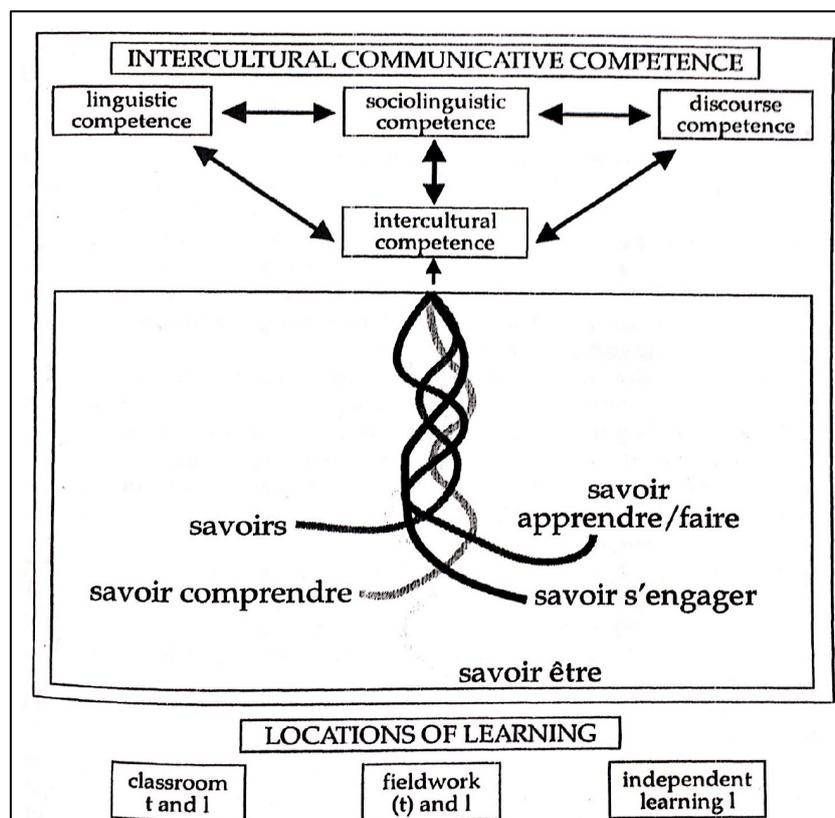


Figure 7: Intercultural Communicative Competence Model (Byram 1997: 73).

Finally, Byram defines three "locations of learning" with different levels of teacher ("t") involvement in the learning experience of the learner ("l"): classroom teaching (teacher present), fieldwork such as an excursion to a historical site (teacher semi-present), and independent learning (no teacher involvement). Each of these learning locations has its advantages; the classroom, for example, offers room to reflect on the real world in a safe environment, but can only simulate intercultural communication which can

be engaged in only during fieldwork or when exposed to the target culture independently from the educational context. As a consequence, the locations of learning are not to be seen as separate entities but very much connected to each other.

In conclusion, intercultural communicative competence is considered the ultimate goal of foreign language teaching and, hence, the primary guideline for syllabus and activity design in the contemporary communicative foreign language classroom. Although the native speaker as the target norm has been criticised here, it remains clear that we need some sort of guideline for a target learner behaviour, be it concerning grammatical accuracy, pronunciation, or lexical choice. Undoubtedly, such guidelines are informed by the communicative behaviour of native speakers to some extent. Byram's true contribution to this discussion is the inclusion of socio-linguistic aspects and the emphasis on the context of communication. This is particularly relevant for the context of this study, where learners participate in a course that aims at preparing them for communicating in an English medical context where both the prospective doctor and the (presumably but not exclusively) native speaker patients bring a set of attitudes, experiences, values, and specific language traits to the table. This creates a culturally challenging and to some extent unpredictable situation which students cannot be prepared for by means of a one-dimensional native speaker model as the target norm.

2.3.2 Task-based language teaching

Having talked about what it means to be a competent intercultural speaker, the attention now turns to how to achieve that state. From a second language acquisition perspective, it has been made sufficiently clear that interaction with others is key to language development (cf. 2.1 The SLA perspective: Interaction and learning). From a pedagogical point of view, the question is how to create such opportunities for meaningful interaction in order to facilitate language development. This is where task-based language teaching (TBLT) comes into play. "Communicative language teaching and task-based approaches to language instruction, both now generally accepted as best practice approaches to L2 instruction, also promote interaction and the use

of meaningful tasks in the language classroom. As such, they provide a pedagogical argument for the use of collaborative writing tasks" (Storch 2013: 18).

But what is a task actually? Although the term 'task' in itself seems rather straight forward in a teaching and learning context, it can mean fundamentally different things: Tasks can be seen as rather concrete descriptions of and/or instructions for learner activity (i.e. the actual exercises learners engage in) but may also describe broader teaching concepts which can include syllabus design, task assessment and task and concept differentiation (Biebighäuser et al. 2012: 14–16). According to Ellis, a task is a work plan for learner activity. It focusses primarily on meaning; it fosters real-world language use; it can, furthermore, involve any of the four language skills; it engages cognitive processes (e.g. ordering, reasoning); and it has a clear-cut communicative outcome (cf. Ellis 2008: 2–10). From a conversation analysis point of view, one could even describe conversations as tasks: After all, conversations always serve a particular purpose. Granted, not every conversation is aimed at solving a complex linguistic or real-world problem. Still, interacting with others in a specific context, medium, and situation in order to achieve a certain communicative goal is a complex endeavour, even more so in a foreign language. Hence, Deppermann rightly calls conversations tasks which are to be solved by the "interactants" in a collaborative manner (Deppermann 2008: 75). Yet another term which occurs in this context is 'exercise'. 'Tasks' are typically defined as more open learner activities which focus on meaning and tend to have a flexible outcome. 'Exercises', on the other hand, can be seen as rather closed activities with a clear focus on form and a rather predictable outcome. Obviously, this distinction is rather gradient and, consequently, tasks may have focus-on-form features or vice versa (Biebighäuser et al. 2012: 26–28).

Task-based language teaching, as a concept revolving around the implementation of tasks, can be considered a profound change of paradigm in syllabus design. A task-based curriculum does not make linguistic phenomena the starting point of course design; it emphasises holistic, real life task-oriented concepts instead. This approach should not be mistaken for

one which disregards linguistic phenomena (focus on form); grammatical features are incorporated into the task, yet not at the centre of attention (ibid.: 12–13). At this point, another terminological caveat is in order: Strictly speaking, ‘task-based language teaching’ implies a purely task- and process-oriented curriculum, which is true in very few educational contexts. Most educational contexts are defined by curricula based primarily on a progression of linguistic phenomena (e.g. tenses) which are supported by task-based instruction to a greater or lesser extent. Hence, it could be argued, most task-oriented teaching contexts should rather be called ‘task-supported’ than ‘task-based’ (cf. Müller-Hartmann and Schocker-von Ditfurth 2013: 203). For the sake of convention and since the term ‘task’, as has been argued above, covers a broad spectrum of meaning, the well-established term of ‘task-based language learning’ will be used.

What makes a ‘good’ task then? Apart from the generally agreed upon desirable task features such as relevance, commitment, transparency, focus on form and meaning, and goal orientation (Biebighäuser et al. 2012: 19–25), the quality judgement of a task depends mostly on the focus the teacher wants to create in the chosen location of learning. Coming back to Byram’s model of intercultural communicative competence, there are three possible locations of learning with varying levels of teacher involvement: the classroom (high level of teacher involvement), fieldwork and excursions (medium level of teacher involvement), and independent learning with little to no teacher involvement (cf. Figure 7: Intercultural Communicative Competence Model (Byram 1997: 73)). Tasks have the potential to cater to and connect specific locations of learning by, for example, bringing native-speaker input (in the form of videos) into the classroom which would otherwise be impossible or require an excursion. From a second language acquisition point of view again, “[...] tasks that stimulate negotiation for meaning may turn out to be one among several useful language-learning activities in or out of classrooms, for they may be one of the easiest ways to facilitate a learner’s focus on form without losing sight of a lesson’s (or conversation’s) predominant focus on meaning” (Long 1996: 454). In other words, learners should be immersed “[...] in open-ended and authentic tasks

which [are] based on real life situations, including a communicative aim that [intends] to engage them in meaningful interaction and collective production through shared decision making, while at the same time allowing them to pay attention to form [...]" (Aydin and Yildiz 2014: 164).

As a side note, tasks not only play a major role in general language classes but also in content-based or content and language integrated learning settings (CBI or CLIL) like the course context of the current study. In content-based instructional settings, students use the language primarily to acquire content area information. This type of instruction originated in L1 contexts where instructors did not have to worry about the language learning aspect. With the emergence of language for specific purposes courses, this content-driven approach evolved into the broader concept of content and language integrated learning (CLIL).

"Where CBI has been developed primarily to assist English language learners who are living in an English dominant environment and who must therefore acquire the language to succeed both in and outside the school setting, CLIL promotes and fosters linguistic diversity in ways that transcend the more survival oriented nature of CBI. [...] Indeed, the cultural component is central to learning in the CLIL framework, whereas in CBI the focus is on the acquisition of academic content and the language related to it. [...] There is another notable difference between CLIL and CBI. In CLIL, the subject or content area teachers themselves often speak the target languages being used and learned via a content-based pedagogy, whereas in CBI the language teacher is at least partly involved in helping learners acquire both the content knowledge and the target language, often in collaboration with subject area teachers" (Hirvela 2011: 42).

Obviously, there is quite some overlap between CBI/CLIL and task-based language teaching: "While tasks are intrinsic to TBLT, they also play a central role in CBI since this approach features as its main aim the integration of content with language teaching goals [...], which is normally achieved by means of tasks that are cognitively engaging for the learners" (del Pilar García Mayo 2015: 1). It could be argued that TBLT is a teaching philosophy and technique which can be applied in different teaching contexts, be it a general language curriculum based on linguistic progression (e.g. in a school context) or a content-based or content and language integrated curriculum (e.g. in a university context). Further terminological subtleties, philosophical differences and teaching implications of content-based instruction (CBI),

content and language integrated learning (CLIL), and task-based language teaching (TBLT) are not discussed to a greater degree here. This study is situated in an English for medical purposes course, yet the focus of the study is the exploration of a task-initiated synchronous interactive writing process on a micro level rather than on a more global pedagogical scope.

2.4 Computer-mediated collaborative writing

Having talked about theories on second language acquisition, the writing process, and related pedagogical considerations, we are finally closing in on the distinctive feature of synchronous collaborative writing: its computer-mediated nature. In this chapter, the initial focus will be on the theoretical concept of computer-mediated communication, web 2.0 development, and wikis as the origin and epitome of computer-mediated collaborative writing. Then, shared documents technology as the evolution of wikis (and the technological means used for this study) will be examined. After a terminological basis has been established, a number of studies in the field of computer-mediated collaborative L2 writing will be discussed in order to show major research trends and paradigms in the field.

2.4.1 Web 2.0 computer-mediated communication and wikis

“The electronic medium constrains and facilitates human strategies of communication in unprecedented ways” (Crystal 2011: 32). This quote can be considered the underlying motivation of computer-mediated communication research in applied linguistics and the social sciences: digital communication differs qualitatively from face-to-face interaction (and written discourse) and it facilitates new ways of interaction (e.g. synchronous written interaction from a distance) and brings about new challenges. From the beginning, scholars pointed out the hybrid nature of computer-mediated communication: “[With its] [...] formality and complexity of language, it [=CMC] could serve as a bridge from spoken interaction to written composition” (Warschauer 1996: 21). Very soon, computer-mediated communication was sub-categorised with regards to the temporal dimension which resulted in the synchronous-asynchronous dichotomy:

Synchronous CMC (SCMC) refers to situations where participants involved in the communication are online at the same time and communication takes place virtually in real-time, while asynchronous CMC (ACMC) refers to communication where participants do not need to be online at the same time, and can read and respond to messages in their own time. SCMC includes chat, MOOs, audio conferencing and videoconferencing, while ACMC includes email, bulletin board systems and blogs, and mailing lists (Stockwell 2010: 84).

Albeit still a common way of distinguishing computer-mediated communication settings, this dichotomy is far from being unchallenged. In a typically synchronous computer-mediated activity like chat⁷, typing speed and the speed and stability of the internet connection cause latencies which in turn make the interaction less synchronous. In line with Warschauer's aforementioned description of the hybrid nature of CMC (cf. Warschauer 1996: 21), written discourse removes basic visual clues of face-to-face interaction which normally organise turn-taking systematically. In a face-to-face conversation, our conversational partner gives us certain clues to let us know when he or she has finished their thought and we tend to let them finish, unless we have a personal agenda of some sort. In computer-mediated interaction, we are missing most of these meta-linguistic clues (cf. Beißwenger 2007: 117; Paolillo, John C. & Zelenkauskaitė, Asta 2013: 119). As a result, interaction loses its linearity and phenomena like "disrupted adjacency" are starting to surface, where the aforementioned features of written discourse, especially in multi-user chats, cause ambiguities and loss of structure in the communication: "Disrupted adjacency results in unintended relevance violations, which can cause online conversations to appear incoherent. For example, it can generate ambiguity and confusion about which message is being responded to, especially if multiple threads of discussion are intertwined (Herring 2013: 249)". Apart from disrupted adjacency, there are orthographic peculiarities in chat and CMC in general:

Three major types of orthographic variation have been found in [...] chat: deletions or reductions, insertions, and substitutions. Deletion or reduction of characters is often related to economy. Insertions may have an expressive motivation (such as emphasis), as may substitutions (Paolillo, John C. & Zelenkauskaitė, Asta 2013: 122).

The aforementioned distinctive features of computer-mediated communication rely heavily on the notion that computer-mediated

⁷ "Chat is a computer-mediated communication (CMC) mode in which users who are simultaneously sharing a computer system exchange text messages. Messages tend to be short, and they appear for users as soon as they are available. The immediate display and consequent interchange of chat messages has an immediacy that has been called "conversational" (hence "chat"), "interactive", and "synchronous", although these terms have acquired distinct technical meanings. Chat may involve two or more participants, with large chats sometimes having hundreds of participants" (Paolillo, John C. & Zelenkauskaitė, Asta 2013: 109).

communication is a tool. Such tools like chat or forums can be categorised by differentiating, e.g. modes of interaction (one-to-one, one-to-many, many-to-many) or the time dimension (synchronous vs. asynchronous interaction), or the primary communication channel used (text, audio, video, audio/video). However, “[...] CMC can be viewed both as a mediational tool and as a communication process. When viewed as tools, CMC is examined from technological aspects that provide the medium for communication and interaction. Other aspects are revealed when CMC is perceived as a communication process, which includes the message, the sender, and the receiver” (Nguyen 2013: 54). And even the technological aspects of CMC are, strictly speaking, only applicable to very isolated and dated web 1.0 phenomena such as chat or forums. A chatroom on a learning platform such as *Moodle*, for instance, requires its users to be present at the same time in order to work, so it is considered synchronous. Forums, by contrast, do not require users to be present at the same time. In fact, synchronous activity in a forum can cause problems such as disrupted adjacency. As a consequence, forums are considered asynchronous CMC. This rather clear-cut distinction regarding the temporal dimension of CMC is very problematic in 2017. Communication technology has come to a point where a single piece of software can cater for a variety of communication and collaboration needs. [...] [There] is [...] an increase in platforms where formerly separate communication forms are provided within one and the same interface [...]. Facebook, for example, allows written interaction in the form of sharing status updates, commenting on them and engaging in private messaging and chat communication, while also providing the option of uploading and sharing pictures and videos [...]” (Locher 2015: 126). *Facebook's* status updates are forum-like, i.e. one person posts an update to the platform and other users can react to it whenever they see fit. The complex group chat facility allows for one-to-one (direct message), one-to-many (broadcast lists), and many-to-many (group chat) communication. Users can choose whether to engage with each other in a synchronous fashion or asynchronously; unlike the early days of *internet relay chat (IRC)*, messages are stored just like e-mails which gives *Facebook's* users freedom of choice. These rapid

developments in communication technology render both the “synchronicity classification” and the “textual/aural/visual grouping of CMC redundant” (Nguyen 2013: 58) as all these methods of computer-mediated communication (synchronous one-to-one text chat and asynchronous one-to-many video postings on *Facebook*, for example) do not exist in isolation but are interconnected and literally just a click away. “Other aspects are revealed when CMC is perceived as a communication process, which includes the message, the sender, and the receiver” (ibid.: 54). When CMC is understood as a communication process (rather than a tool), the medium still constitutes the boundaries of how and where communication can take place, yet the actual communication, rather than the medium, is at the centre of investigation. Such an approach seems to make more sense in an era where new ways of interacting with each other in a computer-mediated environment emerge on a daily basis.

The web in its 2.0 iteration, or the so-called participative web, has been an ongoing development over roughly the last decade. Definitions and terminological boundaries vary, however, most attempts to describe this phenomenon share certain aspects: The user stops being a mere recipient of information but becomes productive him- or herself and creates the content (user-generated content) other users can engage with or (de-)construct collectively (cf. Ravenscroft 2009: 415). The rather bold statement that former content consumers have now become content creators might be misleading. This becomes apparent in the often-cited 90-9-1 rule, which can almost be considered a myth of online culture: “In most online communities, 90% of users are lurkers who never contribute, 9% of users contribute a little, and 1% of users account for almost all the action” (Khuffash 2014). Basically, out of 100 visitors on *Wikipedia.org*, 90 visitors come to consume information, 9 visitors are willing to engage with content on the site (edit, comment etc.), and only one person actually creates content by adding information to the wiki⁸. Accordingly, labelling an entire generation of users

⁸ This observation clearly resembles the pre-web 2.0 myth of the “digital natives” (Prensky 2001), describing all people born after a certain date as natural inhabitants of the digital space who master technology just by being born into the digital age. “[...]H]owever to label an entire generation as ‘digital natives’ is a bold declaration indeed” (McCarthy 2010: 730).

‘content creators’ and ‘active participants of the internet’ is a bold, if not false, statement which not only the (in)famous 90-9-1 rule indicates but educators, who implement technology in their classrooms, can surely relate to. All this is worth mentioning since educators very often use these myths about internet culture in order to justify their use of technology in the classroom – technology for technology’s sake, as it were.

Undoubtedly, wikis can be considered the epitome of web 2.0 development as they make (basic) websites, which used to be static, editable by means of an easy-to-use ‘what-you-see-is-what-you-get’ user interface:

Wikis are websites that can be interactively edited by any number of people using simple online tools. An incremental version of the website is stored each time an edit is saved, making it possible to ‘rollback’ the site to any previous version if subsequent edits need to be undone. What sets wikis apart from other ‘social’ writing and publishing tools (e.g. blogs, photo-sharing, podcasts) is that more than one person typically contributes to the authoring and publishing of specific content, and most wiki tools include a range of features to facilitate these multi-author interactions [...]. This combination of functionality and features has led to wikis being promoted as powerful collaborative learning tools and they are increasingly being used to support group-based collaborative learning tasks (Judd et al. 2010: 341).

Since wiki pages revolve around a concept or a problem which is to be discussed and explained by means interaction, wikis seem almost a perfect fit as a computer-mediated platform for a task-based communicative curriculum. Since engaging in communication is one of the key principles of developing communicative competence, applying a new type of communication with features which facilitate language development, to classroom discourse seems only logical. However, Wikis are not the be-all and end-all of computer-assisted learning in 2017, as will be shown in the following.

2.4.2 Shared documents: Wikis 2.0

In this empirical study, students engage in a collaborative group writing activity using *Google Docs*, a technology associated with the terms “shared documents” (Hofer 2012) or “web-based word processing tools” (Kessler et al. 2012). Shared documents technology has many features in common with wiki technology; however, it differs significantly in a number of ways in its

interactive capacities which will be addressed here. This discussion shall serve as a basis to, on the one hand, interpret and understand the findings of related research studies on collaborative writing (2.4.3 Collaborative L2 writing with technology:) and, on the other hand, to point out the additional value of this contribution to the research field.

As has been previously explained, wikis are essentially websites that can be edited by several users. Iterations of these sites can be tracked and rolled back at any time. In addition, communication features such as forums or a comments function facilitate meta-discourse among users around the actual wiki (cf. Judd et al. 2010: 341). However, "[...] simultaneous editing is not possible in [...] wikis [...] where the user must wait for interlocutors to complete their turns before they have access to each other's text" (Kessler et al. 2012: 100). In other words, the wiki page cannot be edited by one user when another user is editing the exact same page. He or she must wait or (depending on the configuration of the wiki) edit an older iteration of the page which leads to conflicting final versions. As a result, wikis are very often considered better suited for asynchronous group writing projects over a longer period of time. Obviously, such a limitation can be overcome by task design to some degree, e.g. by creating several sub-pages, distributing responsibilities among collaborators more explicitly, or by offering additional communication channels outside of the wiki via the implementation of other tools (e.g. an additional group chat). This setup could be called "web 2.0 mashup" as it combines several web 2.0 technologies in one task environment (cf. Hofer 2012: 103). However, wikis by themselves do not handle both asynchronous and synchronous collaboration well.

This is where shared documents technology steps in. "Google Docs includes functionality that is similar to a number of emerging web-based word processing tools, including simultaneous editing ability and automated updating" (ibid.: 94). So, "web-based word processing tools" or "shared documents" tools (Hofer 2012) can basically be considered information processing tools, like *Microsoft Word* or *Microsoft PowerPoint*, in the internet browser. Some open source tools, such as *Etherpad* (<http://etherpad.org>; accessed: 28 February 2017) solely offer collaborative text editing.

Commercial products such as the *Google G Suite* (<https://gsuite.google.com>; accessed: 28 February 2017) cater for collaborative text editing (*Google Docs*), spreadsheets (*Google Sheets*), presentations (*Google Presentations*), forms (*Google Forms*), websites (*Google Sites*) and a storage solution to save all this data to the internet cloud (*Google Drive*). *Microsoft*, a competitor, offers similar capabilities with *Microsoft Office Online* (<https://www.office.com>; accessed: 28 February 2017). For the purpose of this study (collaborative *text* creation), we focus on *Google Docs*, the web-based text processing tool.

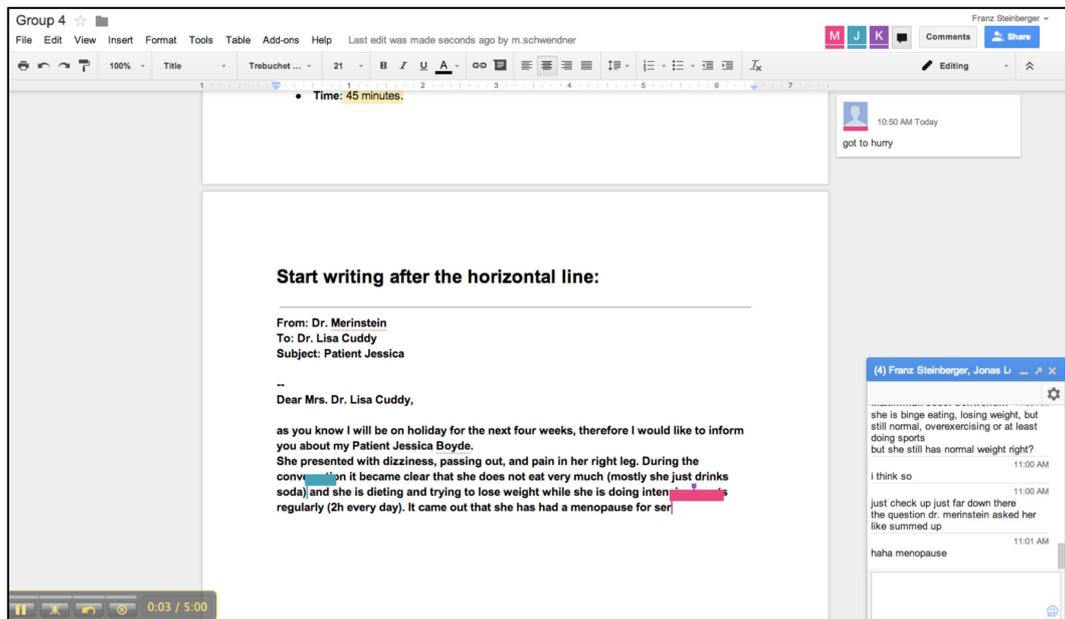


Figure 8: Communication facilities in *Google Docs*: Simultaneous text editing, comments, and group chat (student dummy names were removed).

As can be seen in Figure 8, *Google Docs* looks like a familiar word processor. There is a menu bar (“File”, “Edit” etc.) and a series of controls for basic formatting (font type, font size, bold, italicised, underlined etc.) at the top and a document space for typing in the centre of the screen. In addition, there is a space for comments to be added in the right margin of the document. What sets *Google Docs* apart from a locally installed instance of *Microsoft Word* are its collaborative capabilities: Coloured capital letters (initials of users’ names) at the top right indicate that there are several people in the document at the same time. These colours correspond to the colours of the cursors clicking through the document (centre portion of the screen): Users can add/delete text anywhere in the document at any given

time. This can lead to very interesting constellations where one person is typing in a sentence letter by letter and another person is editing that text at the very same time (e.g. by adding a comma or correcting typos). Also, there is a group chat at the bottom right for group discussions outside of the text (yet still inside the same screen and context). Since the chat is recorded in a chat log (which is accessible for all users by simply scrolling through the chat window), all chat interactions (just like the text in front of the participants) can be read for extended periods of time. This “permanence of the writing” can raise the students’ awareness regarding their own writing and, hence, increase the chances of noticing and learning of language phenomena. It might even raise accuracy and the overall quality of the writing (cf. Kol S. & Scholnik M. 2008: 61).

A ‘feature’ which is likely to be overlooked at first glance is the absence of a “save” button. Changes made to the document are saved constantly, as can be seen in the top centre of the document (“Last edit was made seconds ago by...”); a click on this grey, almost unnoticeable text, reveals the document’s revision history which lets allows rollback in detailed iterations of the entire document from the final version to the blank page at the beginning: “Each iteration is an automatically saved and automatically numbered version (every 11 seconds) of the document; thus, an iteration could be a change to a word, sentence, paragraph, and so forth” (Kessler et al. 2012: 95). These iterations can be assigned to the actual contributors (individual users). Therefore, an iteration can contain several changes made by different users at the same time, each perfectly distinguishable from another⁹. All this shows that *Google Docs*, and shared documents technology in general, is very well suited for synchronous collaborative writing.

What also makes shared documents technology particularly versatile are its asynchronous capabilities and connectivity features: *Google Docs* can, of course, be used by only one user at a time (i.e. asynchronously, just like a wiki) or by individual users, also with revision tracking, which can provide

⁹ However, some information on the writing behaviour can be lost here: If a participant, for example, commits a typo while writing a sentence and is able to correct it right away (before *Google Docs* records it as an iteration), this slip is not recorded (and hence not available for investigation).

useful insights into individual writing processes without any extra effort. As soon as all collaborators have left the document, the document still exists in the internet cloud (here: *Google Drive*). As each document carries a unique, longish internet address (URL), it can easily be shared with others by sending the link or implemented in existing learning environments such as *Moodle*, using basic HTML. Also, documents can be downloaded as various file types (including *.docx or *.pdf) for further offline use in desktop programs. Shared documents technology does not force the user (or educator) to choose between synchronous or asynchronous collaboration – it caters for both modes of working together so technology does not get in the way of teaching but rather is a tool for it. This becomes particularly important when educators want to utilise a blended learning concept, i.e. combine “a face-to-face (F2F) classroom component with an appropriate use of technology” (Sharma and Barrett 2007: 7). Linking technology-mediated online phases with in-class teaching phases in such a way that students can grasp their relevance and relatedness and engage actively with the materials and their peers can be a challenging effort. Implementing shared documents in a blended learning course can bridge this perceived gap between in-class teaching and the online environment. Students can, for example, begin creating a presentation in *Google Presentations* in class (synchronously, sharing one computer or each student working from their own computer) and finalise it within a week for the next session (asynchronously) using the exact same tool. Being able to track every group member’s contributions and having several means to interact with each other (track changes, group chat, comments facility) make collaboration outside of class both feasible and effective.

2.4.3 Collaborative L2 writing with technology: related research studies

Having described the concepts of computer-mediated communication and its more specialised manifestations in the educational context, wikis and shared documents technology, we now look into dedicated research on collaborative L2 writing with technology. This shall provide an overview of prevalent research paradigms in the field and serve as a basis for deducting a possible

need for more specialised research on synchronous collaborative writing with technology. Eleven studies on collaborative L2 writing (the earliest study dating back to 2005) will be discussed. To the author's best knowledge, there is no study which investigates a collaborative writing with all four distinctive features of the current study: synchronous collaboration, only computer-mediated communication, a co-authored text as the desired outcome and shared documents technology as the medium of choice. Attempting to survey the broadest spectrum of studies possible has resulted in a collection of studies mostly focussed on asynchronous wiki-mediated collaborative writing. Studies have been summarised by means of the following categories:

- Participants
- Task
- Theoretical framework
- Research interest
- Data / Methods

General trends in collaborative L2 writing research shall be deducted from the table to place the present study in the context of the aforementioned criteria.

Study	Participants	Task	Theoretical framework	Research interest	Data / Methods
Amirkhiz et al. 2013	N = 8 EFL Iranian / Malaysian students University (Kuala Lumpur)	Collaboratively create a text (offline) based on a graphic prompt in 30 minutes; Groups of 2; Duration: 15 sessions (1 semester)	Socio-cultural theory of learning; Pushed Output hypothesis	Collaborative dialogue; language-related episodes	Pair-talk audio-taped; interviews
Arnold et al. 2012	N = 53 L2 = German Different US universities	Create wiki pages on the historical background of a novel read in class; Groups of 2-3; Duration: 3 weeks	Socio-cultural theory of learning; constructivism; Web 2.0 in education	Revision behaviour; cooperation vs. collaboration; roles	Revision history of wiki pages
Kessler 2009	N = 40 EFL Teacher trainees	Create a class wiki on the term 'culture';	Socio-cultural theory of learning; task-based	Revision behaviour	Interviews; parts of the wiki pages (revision history)

	University (Mexico)	Whole group; Duration: 16 weeks	language learning; learner autonomy		
Kessler and Bikowski 2010 (follow-up study)	N = 40 EFL Teacher trainees University (Mexico)	Create a class wiki on the term 'culture'; Whole group; Duration: 16 weeks	Socio-cultural theory of learning; task-based language learning; learner autonomy	Revision behaviour	Interviews; parts of the wiki pages (revision history)
Kessler et al. 2012	N = 38 (selected: 3 groups) EAP "advanced" Pre-academic orientation program; University	Research project using <i>Google Docs</i> ; Groups of 3-4; Duration: 3 weeks	Socio-cultural theory of learning; Communicative language teaching; Web 2.0; learner autonomy	Revision behaviour; writing process	Random 10% of the revision history of <i>Google Docs</i> documents
Lee 2008	N = 30 L2 = Spanish 15 experts / 15 novices University (USA)	Three different tasks: jigsaw, spot-the-differences; open ended question; Chat;	Socio-cultural theory of learning; Collective scaffolding; Pushed Output Hypothesis	Collaborative dialogue; language-related episodes; collective scaffolding,	Selected portions of the chat logs

		Groups of 2; Six 45-minute chats			
Lee 2010	N = 35 L2 = Spanish Beginners University (USA)	4 tasks: story, description, travel plan, letter; tasks were staged (regarding drafting, writing, revising etc.); assessment of product and collaborative process; Groups of 4-5; Duration: 2-3 weeks per stage.	Socio-cultural theory of learning; constructivism	Effectiveness of collaborative writing; role of the task; collective scaffolding	Interviews; surveys; wiki pages (revision history)
Lund 2008	N = 31 EFL High school (Norway)	Create a wiki on "our USA"; Groups of 2-3; Duration: 2 weeks	Socio-cultural theory of learning; Computer-assisted language learning	Collaboration (in general; exploratory)	Video recordings of in-class sessions; wiki revision history; surveys
Mak and Coniam 2008	N = 24 (focus on 1 group)	Creating a school brochure with	Wikis in ESL writing	Revision behaviour; product quality	Wiki pages (revision history)

	EFL Beginners Middle school (Hong Kong)	wikis; Groups of 4; Duration: 6 weeks			
Storch 2005	N = 23 ESL Intermediate University (Australia)	Write a data commentary text (offline) based on a graphic prompt; Groups: 5 individual writers; 18 writers in pairs;	Socio-cultural theory of learning; Collective scaffolding;	Quality of products (individual writing vs. collaborative writing); collaborative dialogue	Final texts; interviews; pair talk transcribed
Strobl 2014	N = 48 L2 = German (Upper) intermediate University (Netherlands)	Two open-ended writing tasks; tasks were guided by means of a collaborative script (teacher); individual writing or groups of 3; Duration: 4 weeks	Socio-cultural theory of learning; Computer- supported collaborative writing	Quality of products (individual writing vs. collaborative writing); revision behaviour	Final texts; revision history of <i>Google Docs</i> (not possible; students copied and pasted texts from elsewhere); discussions in the comments section

Table 1: Collaborative L2 writing studies.

As can be seen from the overview of related research, the majority of studies investigate learner cohorts of approximately 30-35 students (mean: 33.6). Also, EFL (or ESL) seems to be the predominant context and research focusses on learners with intermediate or higher language proficiency. The majority of (rather open) collaborative writing tasks is facilitated by means of wikis (six studies) or shared documents (*Google Docs*) in an asynchronous wiki fashion (two studies). Collaborative writing activities tend to be carried out in small groups of two-to-four participants.

Only two out of eleven studies (Amirkhiz et al. 2013; Storch 2005) investigate synchronous collaborative writing – however not in a computer-mediated form; both studies have participants work together on a piece of writing face-to-face and with only one person writing. Lee’s 2008 study (Lee 2008) seems to be the odd-one-out as it investigates synchronous L2 collaboration by means of a chat (rather than collaborative ‘writing’ which implies a text as the final product). As student interaction is almost bound to happen in synchronous settings (whereas interaction tends to be accidental in asynchronous collaboration), it comes as no surprise that all three aforementioned studies take an interest in students’ meta-discussions regarding language (language-related episodes) and their engagement in collaborative dialogue. Almost all studies are informed by the socio-cultural theory of learning and the pushed output hypothesis. Interestingly, technology is reflected to some extent in most studies but never takes centre stage as the primary facilitator of learning. This can be taken as a good sign as it indicates the importance of pedagogical considerations over technology for technology’s sake. Three main research interests can be identified based on this selection of related research studies:

- Student text revision behaviour in asynchronous wiki collaborative writing (What is revised?)
- Students’ meta discussions (What do students talk about?)
- Collaborative revision patterns (How do students revise?)

In order to better understand these three distinct research interests, they shall be explained in greater detail in the following.

2.4.3.1 Revision behaviour

Text revision behaviour of participants is a common interest of many collaborative writing studies, supposedly because wikis make it rather easy to track changes with the built-in page history feature. Interestingly, many studies on technology-mediated collaborative writing use a revision taxonomy, geared towards individual L1 writers:

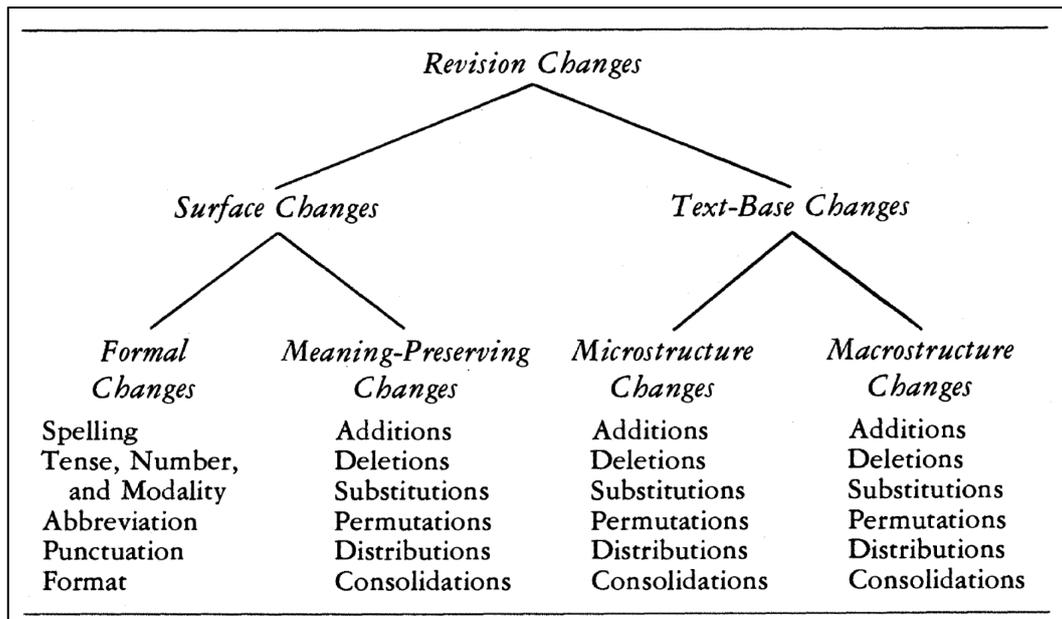


Figure 9: Revision Taxonomy (Faigley and Witte 1981: 403).

Faigley and Witte's taxonomy from over 30 years ago is based on "[...] whether new information is brought to the text or whether old information is removed in such a way that it cannot be recovered through drawing inferences" (ibid.: 402). Faigley and Witte investigate the revision behaviour of individuals who produce text in a pen and paper fashion over the course of three days, which results in three iterations, or revisions, of the text. This context (L1 writers, pen and paper, individual writing, only three revisions etc.) and their research interest (How do revisions to the text affect its meaning?) differ significantly from recent (computer-mediated) studies on collaborative writing. Yet, their taxonomy is used, at least as a starting point, in current research on collaborative writing (Arnold et al. 2012; Dix 2006; Jones 2008 etc.) on a regular basis. One of the reasons why such a taxonomy can be adapted to describe revision behaviour in wikis with relative ease is the nature of wiki iterations. As has been noted earlier, users cannot edit a wiki page simultaneously (cf. Kessler et al. 2012: 100). Wikis, therefore, come

in rather clear-cut iterations as all changes made in one iteration typically belong to one user. Also, users have to actively save the page when leaving the wiki (which one would probably not do before at least finishing a sentence or paragraph). Consequently, iterations of a wiki page resemble (somewhat) finished drafts of a text (like the three drafts in Faigley and Witte's study).

In their 2012 study on "Collaboration or Cooperation? Analyzing Group Dynamics and Revision Processes in Wikis", Arnold and colleagues maintain the basic distinction between surface level "formal changes" and "meaning-preserving changes", yet simplify Faigley and Witte's "text-base changes" to "meaning-developing changes":

<u>Formal changes (surface)</u>	
<i>Format</i>	Adding, deleting, fixing, or moving of an image, link, and heading
<i>Spelling</i>	"Berschwerte" → "Beschwerde" (revision successful); "mude" → "meude" (revision unsuccessful)
<i>Punctuation</i>	"Ziemlich viele Leute denken dass, der Eiserne Vorhang..." → "Ziemlich viele Leute denken, dass der Eiserne Vorhang..." (revision successful)
<i>Verbs</i>	"weil der Krieg endetet" → "weil der Krieg endete" (revision successful); "viele Leute hat gestorben" → "viele Leute haben gestorben" (revision unsuccessful)
<i>Nominal/ Adjectival Endings</i>	"Der Eiserne Vorhang war ein interessant Situation..." → "Der Eiserne Vorhang war eine interessante Situation..." (revision successful); "Der Eiserne Vorhang ist eine Referenz für den Grenze..." → "Der Eiserne Vorhang ist eine Referenz für der Grenze..." (revision unsuccessful)
<i>Word Order</i>	"Der Osten hat vorgetäuscht, dass keine Mauer gibt es ." → "Der Osten hat vorgetäuscht, dass es keine Mauer gibt ." (revision successful); "Die Briten haben nicht wieder für ihn gestimmt." → "Die Briten haben nicht für ihn wieder gestimmt." (revision unsuccessful)
<i>Lexical Revisions</i>	"Churchill hatte der größten Verdacht Stalin." → "Churchill hatte der größten Verdacht von Stalin." (revision unsuccessful); "Hätten wir die Bomben tropfen sollen?" → "Hätten wir die Bomben abwerfen sollen?" (revision successful)
<i>Translation</i>	"Das Geld der Kirche kam von Donation ." → "Das Geld der Kirche kam von Spenden ."
<u>Meaning-preserving changes (stylistic)</u>	
<i>Additions</i>	"Am erste Dezember 1998 hob das GDR (ost Deutschland) Parlament, der Satz, in die GDR Einrichtung welches die SED Gewalt gab auf." → Am ersten Dezember 1998 hob das DDR Parlament den Satz, der gesagt hatte (1 ADDITION), das die SED Gewalt aufgab, in die GDR Einrichtung."
<i>Deletions</i>	"Jugendweihe bevor den DDR war eine populäre Feier für die Jugendlichen," → "Jugendweihe vor die DDR war eine populäre Feier für Jugendlichen," (<i>die</i> deleted)
<i>Substitutions</i>	"weil Religion ist weider eine wichtige Sache zu haben , aber die Jugendweihe bleibt für viel." → "weil Religion, wieder wichtig ist , aber die Jugendweihe bleibt für viel."
<i>Reordering</i>	A word or phrase moved from one part of the text to another
<u>Meaning-developing changes</u>	
<i>Significant Content Additions</i>	"Truman hatte auch Verdacht für Stalin, und suchte eine Weise, vor die Sowjetunion nahm dem Krieg gegen Japan teil, dem Krieg zu enden." (3 ADDITIONS)
<i>Cont. Deletions</i>	Similar to significant additions, but section is deleted from wiki
<i>Factual Correction</i>	"Hause waren von 1971 bis 1919 gegründet." → "Hause waren von 1971 bis 1990 gegründet."

Figure 10: Taxonomy of revisions (Arnold et al. 2012: 437).

While student changes in the course of an asynchronous wiki activity can be both interesting and insightful, one major caveat is in order: All changes

made to a wiki page in an asynchronous setting may be relatable to a specific team member (by the user's account) but students might meet face-to-face with just one person entering text to the wiki and using one student account. As a consequence, changes which result from face-to-face interaction are falsely allocated to one participant. Also, it is very difficult to tell whether or to what degree students notice changes made to a wiki page over several weeks. As noticing, according to Schmidt's noticing hypothesis, is one of the key factors for L2 development (Schmidt 1995: 20), it could be argued that the nature of changes made to a collaboratively authored text reveal little about the learners' conscious learning opportunities.

Findings on revision behaviour tend to be somewhat inconclusive; Arnold and colleagues (Arnold et al. 2012) found no significant differences in revision success¹⁰ when comparing self-revisions to peer-revisions. Mak and Coniam (2008) noted that the display of peer review activity in itself is worth mentioning in their specific Japanese context, where students are generally not used to a learner-centred teaching approach. Studies investigating revision types found a predominance of meaning- and content-oriented revisions (rather than form-oriented revisions) in the wiki pages (Kessler 2009; Kessler et al. 2012). Interestingly, the texts of Kessler's study (Kessler 2009) still contained many form-related errors; in other words, the absence of a certain revision type is not an indicator of text quality – it just means that students did not focus on that area in their review activity. It seems that task type (open or closed) and context (e.g. language proficiency) play a key role here. With most studies in the field being exploratory in nature and, hence, very context-dependent, investigating text revision behaviour does not seem to be as insightful for monitoring learning processes.

2.4.3.2 Meta-discussions

Students' meta-discussions revolving around the actual writing task are of great interest to researchers, mainly for reasons put forward by supporters

¹⁰ Revision success refers to whether the change made to the text resulted in a grammatically sound or wrong form. Whether and how revision success is conducive to second language acquisition is an entirely different question which is not (and probably cannot be) answered in the context of Arnold et al.'s study.

of Merrill Swain's idea of languaging and its potential for language development:

“In order to determine whether [...] collaborative writing is conducive for L2 learning, we need empirical evidence [...] of learners deliberating and reflecting about language use, providing positive as well as corrective feedback, and pooling their linguistic resources to resolve uncertainties about language use, be it vocabulary, grammar or mechanics [...]. Research on whether students engage in languaging [...], which may occur in the discussion/chat pages of the wiki, are relatively rare” (Storch 2013: 144–145).

In line with Storch's judgement above, it can be seen from the overview of related research (cf. Table 1: Collaborative L2 writing studies.) that those studies which include and analyse data on student behaviour outside of the collaboratively authored text do not investigate asynchronous wiki-mediated activities. From a pragmatic point of view, this is hardly surprising. Wikis, as has been mentioned before, are geared towards asynchronous collaboration. Consequently, it becomes very difficult to monitor students' communicative behaviour in collaborative writing projects which last for several weeks. Students may meet face-to-face in the meantime or communicate via e-mail, instant messaging (etc.) – none of which is available for investigation by the researcher. Amirkhiz and colleagues (Amirkhiz et al. 2013) and Storch (Storch 2005) investigate synchronous face-to-face collaborative writing where student interaction is a given. Lee (Lee 2008) investigates synchronous chat-mediated collaboration, yet students are faced with closed activities (such as jigsaws), not open-ended writing tasks. Strobl (Strobl 2014), being the exception, does investigate asynchronous writing and incorporates discussions from forums; yet, the writing activity is not wiki-mediated but via shared documents technology (*Google Docs*). Student discussions are commonly coded according to taxonomies which are mainly created inductively (data-driven) and at times informed by other studies from the field.

% of total (n=119)	Mean / group	Topic	Type	Remark
22.4*	3.38	<i>Morphology, incl. morphosyntax</i>	LRC	Discussed in all but 1 group
17.6	2.63	<i>Style</i>	LRC	Best performance group: 29% of total
14.3	2.13	<i>Content</i>	LRC	Best performance group: 32% of total
12.6	1.88	<i>Lexical choice</i>	LRC	Discussed in all groups
9.2	1.38	<i>Orthography and punctuation</i>	LRC	Discussed in 4 (/8) groups
8.4	1.25	<i>Cohesive ties choice</i>	LRC	Discussed in 4 (/8) groups
5.9	0.88	<i>Syntax</i>	LRC	Discussed in 4 (/8) groups
3.4	0.50	<i>Coherence</i>	LRC	Discussed in 3 (/8) groups
2.5	0.38	<i>Workflow</i>	NLRC	Meant to be discussed in forum
2.5	0.38	<i>Semantics</i>	LRC	Discussed in 2 (/8) groups
2.4	0.38	<i>Layout etc.</i>	NLRC	Discussed in 3 (/8) groups
1.7	0.25	<i>Appraisal</i>	NLRC	Only in best performance group

* Italicized items relate to meaning-preserving changes (LOCs)

Figure 11: Taxonomy of discussion episodes (*ibid.*: 8).

Strobl, for instance, coded the student discussions in terms of topics covered. She differentiates between language-related contributions (LRC) and non-language-related contributions (NLRC). LRCs are further differentiated by their meaning-altering potential with respect to the final text (similar to Faigley and Witte's categorisation of text revision activity, see Faigley and Witte 1981: 403). The twelve categories are ranked according to their frequency of occurrence. Taxonomies differ greatly from study to study and so does the terminology used in these taxonomies. Strobl, for example, differentiates between nine types of language-related discussion areas. By contrast, Storch (Storch 2005) incorporates all these focus areas into one category: language-related episodes (LREs).

Also, both Storch and Strobl compare individually authored texts to collaboratively authored texts in their studies. Strobl finds that "the individual texts differ from the collaborative ones in (a) fluency, and (b) content selection, but neither in (c) accuracy and complexity, nor in (d) cohesion and coherence" (Strobl 2014: 10). Fluency means text length here and it seems hardly surprising that collaboratively authored texts are longer; this "can be attributed to a conglomeration effect of the individual contributions" (*ibid.*). When it comes to content selection, Strobl found that groups of students included far more relevant pieces of content than

individual students did. “Analysis of the process data revealed that this is due to in-depth discussions during the planning phase” (Strobl 2014: 11). Storch also compared texts created by individual writers to those of groups of writers (pairs, in fact). Contrary to Strobl’s results, Storch found that “students working in pairs produced shorter but more grammatically accurate and linguistically complex texts. Pairs also produced texts that had a clearer focus” (Storch 2005: 163). This improvement in linguistic complexity and grammatical accuracy can be attributed to the affordances of collaboration: “[Pair] work provides the learners opportunities to co-construct texts, pool their linguistic resources (collective scaffolding), and thus compose more linguistically complex and grammatically accurate texts” (Storch 2005: 166). In conclusion, findings vary and contradict each other at times with regard to which qualities of the final product are affected by collaborative writing practices when compared to individual writing. However, in general, the effects seem to be positive. What is more, many opportunities for language usage emerge by having students work together – a beneficial condition for language acquisition in itself. We as researchers and teachers tend to focus on the quality of the final product as an indicator of what has been learnt. However, (the quality of) the meta-discussions as a learning indicator are likely to be discarded as a pure means to explain the genesis of the final text.

Finally, it has to be noted that none of the aforementioned studies investigated synchronous computer-mediated collaborative writing, which is the main interest of this study. However, Kessler and colleagues, who investigated revision behaviour in a three-week (hence asynchronous) collaborative writing project using *Google Docs* (Kessler et al. 2012), came across instances of synchronous collaboration by accident (as the activity was set up in an asynchronous fashion, yet *Google Docs* allows for synchronous editing). “Exploring how students simultaneously build on each other as a resource allows for greater understanding of the types of changes they make as they write collaboratively” (Kessler et al. 2012: 100). They argue further that, contrary to studies which investigate oral forms of collective scaffolding (e.g. Storch 2005), collective scaffolding in a written

computer-mediated form has an edge over oral forms of collaborative dialogue. This “[...] results in an increase of textual production as opposed to oral production, an increase in opportunities for practice in writing, and experimentation with alternative phrasings within the full context of the text” (Kessler et al. 2012: 100). In other words, having the text (the matter of discussion) and the chat facilities (the means of discussion) right next to each other increases the presence of text, which not only makes it easier to refer to the text but also might increase levels of language awareness.

2.4.3.3 Cooperation vs. Collaboration

Yet another common interest in wiki research is the exploration of how students work together on a joint project: Do they actively engage with each other or rather work autonomously on their respective sub-tasks? These poles on a continuum are usually referred to as collaboration and cooperation. The terms ‘collaboration’ and ‘cooperation’ are used interchangeably in everyday language. From an etymological point of view, this does not come as a surprise since both words count as so-called ‘hard words’ in English derived from Latin, with *operare aliquid* basically meaning to ‘launch something / put something into action’ and *laborare* meaning ‘to make an effort, to work’; the affix *con-* (derived from the preposition *cum* meaning ‘with’) means ‘together’ in the widest sense of the word. Even in collaborative writing research, as the name suggests, the term ‘collaboration’ often seems to be a rather unproblematic term to describe the joint effort of two or more people to create something together – without further differentiation. However, the two terms ‘collaboration’ and ‘cooperation’ are also used in order to describe two different approaches of group members to solve a joint task. In the following, a short collection of definitions for the two concepts will clarify the different dimensions of these two related, yet slightly different guiding principles of group work. All definitions are taken from contributions in the field of collaborative computer-mediated writing research. The first is cooperation:

- “[...] [C]ooperation can be achieved if all participants do their assigned parts separately and bring their results to the table; [...]” (Kozar 2010: 17).

- “Cooperation allows for some independent work of group members, who take responsibility for specific sub-tasks to be assembled into a larger whole at the end” (Arnold et al. 2012: 433).
- "Co-operation usually implies either splitting up the work or solving subtasks individually and combining the results into a final product" (Scanlon 2000: 464–465).
- "[...] [In] the cooperative approach each member of the group read the previously posted text and then added to the topic. [...] [There] was no evidence of co-construction, or a focus on language form" (Storch 2013: 150).

Working together on a text in a cooperative fashion primarily implies a clear-cut distribution of subtasks among team members: Subtasks of a greater group task are delegated to team members in advance. These subtasks are handled by individual team members rather independently from the rest of the team during the group activity and are consolidated at the very end of the cooperative activity into one big picture. This means that every sub-task serves the overall team effort, but, for extended periods of time, team members work autonomously and without constantly checking with their peers. As this approach to group work does not necessarily require team members to work synchronously over the whole course of the activity, it is mainly applied in asynchronous group work settings. This means participants can, for long periods, work independently from each other. It is only at the end that students might have to be present at the same time to consolidate their individual work into one joint text. In such cooperative, mostly asynchronous group work settings, it tends to be rather easy to allocate portions of or changes to the text to individual authors as team members scarcely work synchronously on the exact same portion of the text which would make it difficult to assign authorship. The situation is quite different when working collaboratively:

- “[...] [Collaboration], in contrast, implies direct interaction among individuals to produce a product and involves negotiations, discussions, and accommodating others’ perspectives” (Kozar 2010: 17).

- “Collaboration, in contrast, does not include such task specialization, and instead requires synchronous work of all members on a variety of aspects of the project” (Arnold et al. 2012: 433).
- “[...] [Collaboration] can mean a coordinated attempt to solve and monitor a problem together, with perhaps some division of labour on aspects of the problem”. (Scanlon 2000: 464–465)
- “In collaborative groups learners engaged in co-constructing the wiki page by reading, evaluating, and refining ideas posted by their peers. In such texts, it was no longer possible to separate the contributions of individual members, as the members became the joint owners of the entire text” (Storch 2013: 150).

Working together on a piece of writing in a collaborative fashion, by contrast, implies the whole team works together on a joint problem. Also, interacting with each other’s ideas and contributions and incorporating them into one’s own writing seems to play a role here. Although, as the literature suggests, collaborative patterns can emerge in asynchronous wiki settings, it seems less likely to be the other way round, i.e. cooperation in a synchronous computer-mediated setting (e.g. a synchronous group writing activity with shared documents). Naturally, synchronous collaborative contexts favour a collaborative pattern as all the collaborators are already in one place and interaction among participants is simply more likely to happen.¹¹

Studies investigating modes of working together produce inconclusive findings. Either, both modes (collaboration and cooperation) are displayed in equal proportions, with no specific roles taken by the participants (Arnold et al. 2012; Lund 2008), or little to no collaborative behaviour could be monitored, possibly due to the asynchronous nature of the task (Judd et al. 2010). Again, task settings and context vary greatly in the aforementioned rather exploratory studies, which might explain the mixed results. From a socio-cultural learning theory perspective, it could be argued that the collaborative pattern of working together caters better towards language

¹¹ Although the terms ‘collaboration’ or ‘collaborative’ refer to a very specific mode of working together (see above), we shall use the terms ‘collaboration’ and ‘collaborative writing’ in the following in the aforementioned everyday notion of ‘working together’, unless stated otherwise explicitly.

development as it creates more opportunities for peer interaction (ibid.: 342).

2.5 Research questions

The overview of collaborative L2 writing research has shown:

- Collaborative L2 writing has a rich tradition of exploratory qualitative research (relatively small sample sizes, qualitative methods).
- Primarily socio-cognitive and cognitive theories on second language acquisition serve as the theoretical framework for collaborative L2 writing.
- Research focusses on revision behaviour both in terms of what is revised and how revision is carried out in terms of participation (cooperation/collaboration).
- Studies on the collaborative process (as it becomes evident in participant interactions) are relatively rare due to this data not being collected in asynchronous collaborative writing activities.

Since none of the aforementioned studies explore synchronous collaborative L2 writing with technology, additional research is required to investigate this new, complex web-based way of creating text together.

As has been argued in chapter 2.1 The SLA perspective: Interaction and learning, learner interactions serve a dual role: First, they make learning processes visible as students voice areas of concern or interest. Second, learners who notice, point to, and reflect on language phenomena can be considered more likely to have increased language awareness; this might lead to internalisation of these phenomena: "[...] [Language] use is both communication and cognitive activity. Language is simultaneously a means of communication and a tool for thinking. Dialogue provides both the occasion for language learning and the evidence of it. Language is both process and product" (Swain and Lapkin 1998: 320). That is why the author believes that it makes most sense to investigate the learners' interactive practices where they actively (and transparently) point to certain aspects of the collaborative activity. Following Schmidt's noticing hypothesis again, attention is a prerequisite for perceiving information which is needed to make noticing possible – the key for internalising knowledge (Geist 2013: 25).

The main research interest of this study is: “How do L2 students negotiate the synchronous collaborative text creation process with *Google Docs*?”. As this qualitative exploratory study takes place in a very specific context with only a limited number of participants, the less general and context-sensitive research question has to be: “How do German medical students, set-up in groups of three, negotiate the synchronous creation process of a medicine-themed e-mail using *Google Docs* for both writing and interacting with each other?” Such a (still) broad research interest calls for feasible, clear-cut research questions. That is why specific aspects of the collaborative writing process, which in themselves are both relevant for participants and language learning in general, have been chosen for investigation:

1. How much time do small groups of L2 students spend in the three communication channels of *Google Docs* in a synchronous group writing activity?

As *Google Docs* is a complex web-based word-processing tool that offers various ways to interact within a shared document (via chat discussions, text edits, comments), how students use the various communication channels over the course of the task will be investigated on a macro level. Time spent contributing to chat discussions, time spent entering text in the document, and time spent engaging in comments to the document is measured and depicted schematically primarily at a global level. Metrics, like total number of chat turns or total amount of time needed for task completion, will paint a macro picture of the collaborative practice. This data serves as the basis to interpret differences and similarities in communication channel usage and shall further inform the more in-depth analysis of the participants’ interaction. This investigation will shed light on how people engage with this type of technology when confronted with a complex collaborative task.

2. What do small groups of L2 students (not) focus on in their task-related meta-discussions?

Students were given a rather complex collaborative task to be completed within a tight time frame. Typing was the only available means of

interaction; since it typically takes more time to communicate an idea in written form, students had to focus their communicative capacity on what they felt was worth discussing with their group members (and what was not). These focus areas of discussion shall be investigated by a qualitative analysis of discussion episodes, which take place primarily in the chat but might also transition into the text portion of the document. Knowing what students decide to discuss (and what not) and how they use *Google Docs* in order to do so is at the centre of this investigation. This endeavour will provide a more detailed insight into collaborative practices in a synchronous collaborative writing activity

3. How do L2 students experience the synchronous collaborative text creation process with *Google Docs*?

Having looked at the collaborative process from a macro perspective (research question one) and how collaborators shape their collaborative effort (research question two), now the students' perception of the synchronous collaborative activity is taken into consideration. In a survey, students are asked about their experience working synchronously with computer-mediated communication facilities as their only means of interaction. Additionally, questions regarding their prior experience with this kind (or similar kinds) of technology are included to provide some context for interpretation. Finally, students are asked to assess the task as such and imagine scenarios where this kind of technology implementation could add value to or at least be a valid tool for collaboration. Incorporating the students' perspective should also be useful piece of additional input for interpreting the findings of research questions one and two.

This in-depth qualitative approach to analysing the interactive practices ensures a comprehensive understanding of the synchronous collaborative process as it shows how participants negotiate and shape a technology-mediated collaborative activity using state-of-the-art collaborative technology. It can also point towards opportunities for language learning – the ultimate goal of implementing any type of activity or technology in the language classroom.

3 Methodological approach

This chapter is dedicated to the methodological approach taken in the study. After a brief summary of the underlying methodological principles from a theoretical point of view (3.1 Basic assumptions and qualitative research design), the research context is presented, i.e. the language course setting, the participants, the task design and the dual role of the teacher as a researcher (3.2 Research context and task design). The focus will then be on the data collection approach, i.e. the various data sources, their compilation into a researchable dataset, and the methodological limitations of this study (3.3 Data collection). Finally, the data analysis approach taken (3.4 Data analysis) is presented.

3.1 Basic assumptions and qualitative research design

Qualitative research aims to either describe social processes in a confined context or deduce regularities and transfer those into hypotheses, models, or theories (cf. Kelle and Kluge 2010: 10). This qualitative research study follows a data-driven exploratory approach: Phenomena which appear in the dataset are described and analysed in order to answer a set of explorative research questions (cf. 2.5). However, a more radically empirical approach is taken: 'Looking into people's heads', i.e. investigating personalities, motives or social background which may influence behaviour is not the aim of this study. Instead, interactive processes shall be explored primarily by analysing the complex 'text' which emerges from the data collection (Deppermann 2008: 82–83). The sample size of this study is limited, which introduces the issue of generalisability. As Kelle and Kluge point out, the (e.g.) behavioural practices found in the data of a qualitative study do not actually represent the whole group of people these participants are a part of. Qualitative research does not claim to result in a 100 percent accurate, scaled-down image of reality. A qualitative research approach aims to identify theoretically relevant combinations of certain features of certain phenomena in a specific context; by doing so, one is able to identify, describe, and explain new phenomena as

they deviate from existing categories (or do not) (cf. Kelle and Kluge 2010: 55). The radically empirical claim of the Grounded Theory (GT; Glaser and Strauss 2005: 47) is considered an ideal (rather than a methodological dogma) to delve into the data in an unbiased way or, at least, in a reflective manner. Categories used to describe the dataset are derived from related research studies on computer-mediated collaboration (deductive categorisation), from the dataset itself (inductive categorisation), or a combination of both. Inevitably, using categories from other research studies (with different contexts, learners, task design, research questions etc.) comes with risks as these categories may be prejudiced against these specific contexts and may therefore cause us to overlook phenomena unique to our dataset (cf. Mayring 2010: 20–21). That is why the category system(s) used for this study will be discussed and contrasted with existing systems in great detail, particularly when describing students' interaction behaviour (3.4.3 Discussion episodes).

3.1.1 Steps in the qualitative research process

The general research interest of the current study is: “How do groups of L2 students negotiate the synchronous collaborative text creation process with *Google Docs*?”. This general research interest then has to be narrowed down by means of workable research questions which can be applied to and answered by analysing empirical data (cf. Flick 2011: 134). This reduction of scope, however, also creates a risk of eliminating the alleged advantage of exploratory research: the ability to identify new phenomena by means of an open research approach (cf. Kelle and Kluge 2010: 109). In this study the specific research questions are:

1. How much time do small groups of L2 students spend in the three communication channels of *Google Docs* in a synchronous group writing activity?
2. What do small groups of L2 students (not) focus on in their task-related meta-discussions?
3. How do L2 students experience the synchronous collaborative text creation process with *Google Docs*?

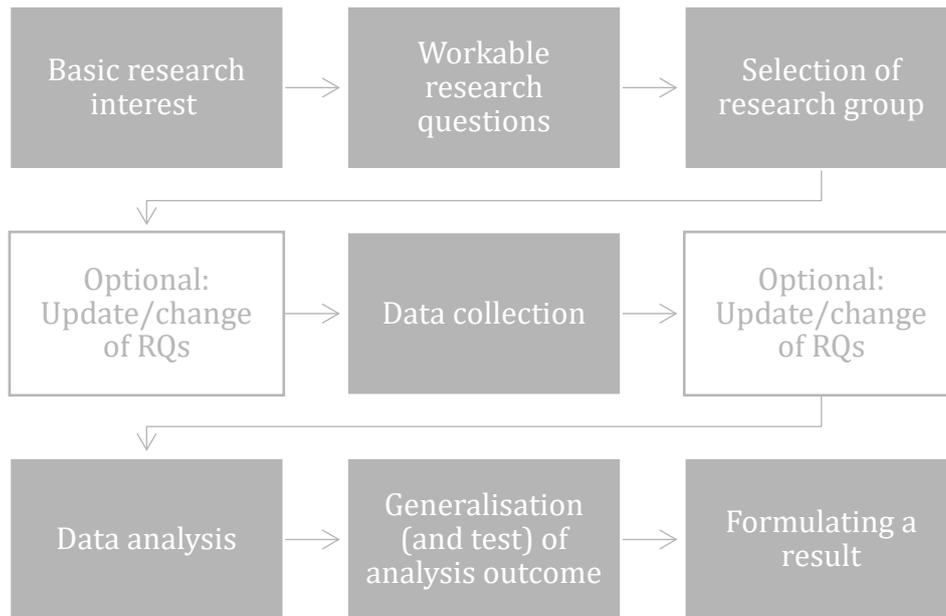


Figure 12: Qualitative research design (inspired by Flick 2011: 134).

The next step is selecting a suitable research group on which these questions can be investigated. Then, an appropriate research design and methods have to be chosen. As soon as the research context is set, the research questions may have to be adapted once more. Next, the data has to be collected. Again, the research questions might have to be changed slightly at this point. Finally, the data is analysed, the results are generalised (within the constraints of a study with a limited sample size), tested, and discussed (Flick 2011: 134).

3.1.2 Content analysis, grounded theory, and conversation analysis

The primary means of data analysis in this empirical study revolve around the methods of Qualitative Content Analysis (QCA; German: 'Qualitative Inhaltsanalyse'). Also, some techniques for coding the data associated with Grounded Theory (GT) have been borrowed. Finally, some basic assumptions of Conversation Analysis (CA) have been adopted for organising and interpreting the data. This methodological configuration shall be presented in the following.

According to Mayring, qualitative content analysis (QCA) aims at describing communication which has been documented in some shape or form. This description is carried out systematically, following a set of rules

and theories by which the data is described, categorised and analysed. As content analysis not only aims to describe content but also, e.g. the negotiation practices of that content, Mayring even suggests a different term (german: *kategoriengeleitete Textanalyse*), which may be translated as ‘category-driven text analysis’ (cf. Mayring 2010: 12–13). The primary functions of a qualitative analysis, Mayring continues, are the following: finding hypotheses and creating theories, carrying out pilot studies and single-case studies, lending more (qualitative) depth to existing studies, analysing processes, establishing systems of classifications, and testing hypotheses and theories (cf. Mayring 2010: 23-25). Several of the aforementioned functions apply to this study:

- This study describes the interactive text creation process of L2 learners (process analysis).
- This study is exploratory in nature, it comes with rather open research questions (pilot study).
- Category systems of existing studies are reflected, tested on, and adapted to the data. This results in a category system unique to this study (establishing systems of classifications).
- Underlying hypotheses and theories on the learning opportunities are applied when interpreting the data (testing hypotheses and theories).

Mayring also suggests a set of guidelines for developing a qualitative content analysis, based on methodological assumptions from related research domains (communication sciences, hermeneutics, social sciences, linguistics, literature studies, psychology of text processing and category development); those guidelines that seem applicable to this study are presented in the following:

- The creation of categories has to be systematic and replicable.
- The process of data collection and compilation has to be transparent.
- Pre-existing knowledge, underlying theoretical assumptions, and research questions have to be reflected.
- QCA is by definition never finished; material can always be re-interpreted.

- Linguistic concepts can be used as categories of a QCA.
- QCA aims to systematically summarise language material in order to create theoretically relevant categories.

(cf. Mayring 2010: 26-49)

When undertaking a more or less exploratory study such as this, one is tempted by the premises of the Grounded Theory (GT): Everything is to be considered data and prior knowledge of the field of study (related literature in general, scientific theories in particular) should be disregarded in order to be completely unbiased. Related empirical studies, for instance, may use highly context-specific systems of categories. Applying such categories to an entirely different set of data might contaminate the findings as a 'foreign' set of categories and might cause the researcher to implicitly neglect phenomena which are specific to the study's own data. As a consequence, categories or any sort of generalisation should be based on the data exclusively. That is why comparisons or references to related literature should be made after the (at least initial) coding process (cf. Glaser and Strauss 2005: 47). Obviously, there may be a number of issues associated with such an approach. First, most research studies do not exist in isolation; they are motivated by e.g. new technological developments or simply by an underrepresentation of certain aspects of an otherwise well-researched field. That is why even exploratory studies such as the current study exist in a well-defined research context and are the result of it, which negates the possibility of completely discarding everything one knows. Also, as Kelle and Kluge point out, researchers do not just enumerate observations and summarize them into certain terms. Abstract terms and concepts do not just summarise a set of observations, they help to explain certain phenomena by putting them into the proper context. And this process is always guided by established research and existing beliefs (cf. Kelle and Kluge 2010: 21). Therefore, the decision was made to not take a Grounded Theory approach as the primary means of data collection and analysis for this study. However, the principles of Grounded Theory have been used to avoid taking existing concepts for granted and to challenge them if required by the data. This implies the willingness e.g. to change or adapt categories which had been used in a somewhat different

research context and are now to be applied to the data in order to reduce possible contamination of the findings.

Another methodological approach which had been considered for this study, is Conversation Analysis (CA). After all, participants in collaborative computer-mediated writing activities engage in conversation, so applying conversation analysis makes sense in order to investigate these communicative practices in a synchronous computer-mediated setting on a micro-level:

Most of the studies to date which examine SCMC incorporate some type of qualitative analysis with excerpts of the data; however few do this in a microanalytical perspective. [...] CA focuses on the description of [...] conversation [...], based on the idea that interaction is structurally and systematically organized and that is mediated or accomplished through the use of sequential patterns. In order to discover such sequential patterns, and participants' orientation to them, it is important to do a bottom-up, inductive, data-driven analysis in which such patterns are not the result of preformulated theoretical conceptions but rather those which emerge from the participants during the interaction (González-Lloret 2011: 310).

Hence, Conversation Analysis aims to describe communicative practices very much on a micro-level, and draws upon the 'text' (in most cases: the written transcript of oral interaction) as a primary, if not the only data source. Explanations based on CA can be considered anti-reductionist – therefore, any type of interactive event is not seen in isolation but in connection with the conversational environment. Interactions are primarily evaluated based on their interactive consequences. Whether an utterance is assessed as a request, a question, a rhetorical question, or a statement (etc.) is purely based on the utterance's effect on the ongoing conversation (i.e. the utterance is interpreted both retro- and prospectively). This approach is supposed to eliminate subjectivity from the analysis since CA does not incorporate participants' views or other external factors in the interpretation of the communicative practices (cf. Deppermann 2008: 82–83). The 'text' which is analysed can include video and/or audio recordings or, in the case of computer-mediated communication, the application of eye-tracking technology. The type of data collection depends on the scope of the research question and the existence of recording devices or personnel should not

contaminate the 'naturalness' of the communicative situation (Deppermann 2008: 25; Flick 2011: 373).

Therefore, CA clearly has merits for analysing interaction, also in the digital realm which offers many distinctive features to influence interactive practices, such as disrupted adjacency in multi-user chat turn-taking (Paolillo, John C. & Zelenkauskaitė, Asta 2013: 120). "CA can be an appropriate tool for the study of SCMC, depending on the focus of the study. CA is better suited for discovering patterns of how the participants carry out the interaction and how they orient to the sequences developed while they construct authentic conversation [...]" (González-Lloret 2011: 317–318). However, this study is primarily interested in participants' communicative macro behaviour (channel usage) and the content of what they decide to bring up in their discussion episodes (cf. 2.5). Certainly, participants' interactive practices on a micro-level are one interesting aspect of the complex data (and can be investigated in future studies) but the exploratory nature of this study demands a broader approach to the data. Conversational data gathered from computer-mediated discourse is rather complex and, as we shall see later on, the concept of an utterance as the object of investigation can be a problematic one. Finally, since the students' interactive behaviour is not analysed in isolation but with regard to the classroom reality (task setting, affordances for second language acquisition), external factors like the products of the collaborative activity (and their quality) and the participants' experience have to be taken into account. This approach is therefore in stark contrast to the radically empirical claims of Conversation Analysis. Nevertheless, certain assumptions of CA shall be taken as guidelines for this study: First, phenomena found in the data shall always be interpreted in context rather than in isolation (interpreting utterances retro- and prospectively). Second, the participants' perspective shall be an additional source of interpretation, not the only one. Third, the data collection approach taken should strive not to contaminate the naturalness of the situation, albeit the concept of 'naturalness' in a classroom situation has been challenged (Deppermann 2008: 25).

3.2 Research context and task design

This chapter covers the task context and task design of the activity under investigation. Understanding task design, the language level of participants, their social configuration in the activity, the integration of the task in the language course, time constraints, the technical implementation, the instructions given, and the role of the teacher (amongst other things) are of paramount importance for anyone who wants to interpret the data gathered in this project.

3.2.1 “Medilingua.lmu.de Vorklinik – English B2.1: Fachsprache Humanmedizin“

The synchronous collaborative writing activity took place in an English for medical purposes blended learning course, “Medilingua.lmu.de Vorklinik – English B2.1: Fachsprache Humanmedizin”. The course is geared towards medical students in the preclinical stage of their medical studies who want to go abroad in order to practice medicine in an English speaking environment. The course is not primarily a terminology class but is rather focussed on intercultural communication in a medical context: Taking patient notes, interviewing patients, giving medical advice, achieving patient compliance, and learning the communicative techniques and strategies needed for these tasks are at the core of the course curriculum.

The course is one of a range of obligatory electives within the medical studies at Ludwig-Maximilians-Universität München that students may choose in the preclinical stage of their studies. Although the course grade does not have a huge impact on students’ final grade in the medical state exam, it appears prominently on the students’ final end-of-studies state exam certificate. As a consequence, students in the medilingua.lmu.de program tend to be highly motivated and engaged in the course.

The medilingua.lmu.de program began as an EU funded research project which was the dissertation project of Prof. Dr. Petra Kirchhoff (Kirchhoff 2008), professor of English language teaching at Regensburg University since 2013. The project was adopted into the regular course program of the Language Center at Munich University

(www.sprachenzentrum.lmu.de) in 2006 and has been developed further by employees of the language centre Munich under the supervision of the author of this thesis. Medical course offerings in Dutch, Portuguese, Spanish, and Turkish have also been added to the program.

The course is offered in a blended learning configuration, combining “a face-to-face (F2F) classroom component with an appropriate use of technology” (Sharma and Barrett 2007: 7). Three six-hour workshops on three consecutive Saturdays are interspersed with online phases in an “intermixed” fashion (cf. Meskill and Anthony 2010: 10), which means students carry out tasks relevant to the face-to-face sessions without purely replicating activities from the in-class sessions. Students are not only expected to work individually on the online phases but interact with their peers in forums on the learning management system *Moodle*¹², hosted on servers from Munich university¹³:

Moodle’s biggest draw is that it allows you to organise a wide variety of resources and activities in one place along with learner tracking and individual learning pathways. [...] Moodle is opensource. This means that the code is freely available. As a result, it is free to download, there is global support for it from enthusiasts and professionals and it is customisable. That means you can brand it the way you want it by choosing your own banners, organisation, layout, content and modules (Stanford 2008: 58).

The learning platform plays a dual role: It is used in an administrative or “pseudo blended learning” fashion (Steffens, D., Reiss, M. 2010: 5), to keep the student roster, track results and grades, provide (often copy right protected) materials for classroom use in a protected environment, and broadcast announcements, changes, and reminders. It is also a virtual space where actual learning takes place through computer-mediated student interaction, such as forum discussions and collaborative, mostly asynchronous activities that utilise the time and space benefits of the online environment. The course syllabus with deadlines, online and in-class assignments, and all course materials (videos, pdfs, links to websites or files) are kept on the learning platform in order to make and keep the online

¹² <https://moodle.org> (accessed: 25 April 2017).

¹³ <https://www.gwi.moodle.elearning.lmu.de> (accessed: 25 April 2017).

learning environment relevant and create a meaningful link between online and face-to-face class time.

3.2.2 Participants

The participants in this study filled out a survey after the collaborative writing activity to record basic personal information and information relevant to the collaborative writing activity, which shall be briefly presented in this chapter.

Twenty-four medical students took the course and participated in the synchronous collaborative writing activity. The average age of the students was 21 years. 18 students were female, six students were male. Only students with at least a language level of B2 (Common European Framework of Reference for Languages; CEFR) are allowed to take the course. Language proficiency is determined before the course by means of the Oxford Online Placement Test (www.oxfordenglishtesting.com). Students who score B1 or lower, are removed from the course after registration. Twenty students scored C1 in the test, three students scored B2 and one student scored C2. When asked about their mother tongue(s), 19 students stated German was their mother tongue and one student identified Arabic as his or her mother tongue. Four students indicated two mother tongues with three students having German and English as their mother tongues and one student having Arabic and English as their mother tongues. Interestingly, all four bilingual¹⁴ students scored C1 in the placement test. When asked about their experience with digital collaboration tools (“1a. Have you ever used *Google Docs* OR similar tools before?”), six students answered “yes”. When asked about collaborative writing (“1b. Have you ever worked on a text with somebody at the same time (= synchronously) using *Google Docs* or similar tools?”), five students answered “yes”, nineteen students answered “no”. When asked to specify their experience, students answered “Google Drive” (3), “Google Docs” (2), “Dropbox” (2), “Facebook” (1), and “Microsoft Office 365, Microsoft

¹⁴ The terms ‘mother tongue’, ‘bilingualism’ or ‘multilingualism’ are, of course, not as straightforward. Since these data points here are primarily recorded for documentary reasons to provide context, the concepts of ‘mother tongue’, ‘bilingualism’, and ‘multilingualism’ are not discussed here.

One Drive” (1). Nineteen students stated that they had never used *Google Docs* or comparable technology.

In conclusion, the participants in this study have a very advanced level of English (C1 on average), are primarily German native speakers (19 plus three), and only five out of 24 participants had previously used collaborative technology to jointly create a piece of writing. Based on the author’s experience in recent years, the participant group was rather typical of the *medilingua.lmu.de* program in terms of age, gender, mother tongue(s), and language proficiency.

3.2.3 Task design

The collaborative writing task takes place at the beginning of workshop two (of three). In order to grasp its meaningfulness, the task context, i.e. what happens before and after the task, has to be described. This chapter covers the task context and its implementation as well as the task itself.

3.2.3.1 Task context

As mentioned above, the course “*medilingua.lmu.de* Vorklinik – Englisch B2.1: Fachsprache Humanmedizin” aims to prepare medical students of Munich University for communicative challenges in the medical field. Since it is not a terminology class per se, the focus is on communicative practices in the English-speaking world of medicine. As the course is geared towards German L2 learners of English, the guiding principle of the course curriculum is content and language integrated learning (CLIL; for theoretical considerations please refer to 2.3.2 Task-based language teaching).

In workshop one, the course syllabus emphasises the doctor-patient interview: Among others, structuring a patient interview, asking the right questions in an appropriate manner, using softened, tentative language play a major role in gathering necessary information from the patient and achieving patient compliance. In order to raise the students’ awareness of these aspects of doctor-patient interaction, video analysis of actual doctor-patient interaction is used as a stimulus for further learning opportunities. A series of three short (two to five minute) video clips of a fictitious¹⁵ doctor (“Dr.

¹⁵ The videos are staged, performed by actors, and were licenced for classroom use during course development.

Merinstein”) and a teenage girl (“Jessica Boyd”), who presents with complaints of occasional dizziness and leg/knee pain, serve as a basis for analysis. Her father (“Mr Boyd”) who is also the coach of the girl’s track and field team accompanies her; he seems overly ambitious regarding his daughter’s athletic performance. In the course of the interview, it turns out that the patient might be over-exercising and that she might have developed an eating disorder. The doctor uses particular strategies to gain the patient’s trust and gather the information needed for a possible diagnosis and treatment plan, for example starting with unproblematic questions about exercise routine and gradually working his way towards more problematic topics like nutrition, sexuality, body image, family and peer pressure. All these strategies, techniques and language means are to be found inductively by the students working in pairs and then collected and discussed in a plenary discussion at the end. The results are then compared with the so-called “Calgary-Cambridge-Guide to the Medical Interview”, a “comprehensive clinical method that explicitly integrates traditional clinical method with effective communication skills” (Kurtz et al. 2003: 802).

Online phase one first and foremost aims to further raise the students’ awareness of the importance of communication in doctor-patient interaction and to propose a patient-centred approach. The online phase is also meant to prepare students for workshop two in terms of content and language means to develop their ability to conduct successful patient interviews in English themselves. Online phase one consists of three distinct parts:

(1) Essay writing

Students are given three articles as stimuli for an essay they are to compose: “Should Physicians Use Email to Communicate With Patients?” (Kvedar and Bierstock 2012), “Misunderstandings in prescribing decisions in general practice: a qualitative study” (Britten et al. 2000), and “What is patient-centred healthcare? A review of definitions and principles” (International Alliance of Patients’ Organizations 2007). These articles serve as the basis for the essay topic “Can a patient-centred approach counter some of the challenges healthcare systems face today? What role does non-face-to-face communication play in a patient-centred healthcare approach?”. Students are

asked to write a short paragraph on the forum (approximately 250 words) and then comment on their peers' work.

(2) Medical summaries

Additionally, students are asked to read three short articles from the "New England Journal of Medicine": "Eating Disorders" (Becker et al. 99), "Anorexia Nervosa" (Yager and Andersen 2005), and "Bulimia Nervosa" (Mehler 2003). These articles are meant to give the students (who are only in the beginning stages of their medical studies) a proper factual background for further patient analysis of Jessica Boyd (the teenage patient from workshop one). Students are tasked with summarising these articles, highlighting the most important aspects of these conditions/diagnoses, in groups of three (randomly chosen by the teacher). These group summary documents are then uploaded to the platform using the "assignments" feature in *Moodle*.

(3) Exercises on terminology

Finally, students are asked to read the handout "Symptoms and Signs", taken from the book "Professional English in Use: Medicine" (Glendinning and Howard 2007: 36f.), on describing patient complaints, presenting them and talking about symptoms. Students are then asked to complete a fill-in-the-gap exercise which is to be peer corrected in-class during workshop two.

3.2.3.2 Task set-up: Task type, social configuration, technical realisation, task goal

This chapter introduces the collaborative writing activity that is investigated in this study. First, however, the course context of workshop two has to be described: After a quick welcome round and some administrative business, workshop two starts with the students peer-correcting the terminology exercises from online phase one. Then, the teacher introduces some of the arguments put forward in the essays from online phase one in order to encourage a short group discussion on the topic of patient-centred healthcare. Afterwards, a collection of common (or interesting) language issues from the essays are presented by the teacher to be solved by the student group. Now, the writing task is introduced. Following Ellis' definition, a task is understood as a work plan for learner activity. It focusses primarily

on meaning, fosters real-world language use, engages cognitive processes (such as ordering, reasoning, and discussion), and has a clear-cut communicative outcome (cf. Ellis 2008: 2–10).

The task in question revolves around collaborative writing: “Collaborative writing involves learners interacting in pairs or small groups on a writing task. Thus the two key components in collaborative writing are verbal interaction and writing” (Storch 2013: 6). In our case, students are working in groups of three. In workshop one, students were assigned to their groups randomly by putting the numbers one, two, three sequentially and repetitively next to the students’ name in the alphabetically organised student roster. These were the same groups which were used for the collaborative summary of medical articles in online phase one; as a result, the groups should have had a homogenous medical content basis to rely on. As the face-to-face part of the course takes place in the multimedia language lab (“Multimediasprachlabor”) of the language centre of Munich University, every student was seated at a computer. A *Google Docs* document was created for each group and named accordingly. Although *Google Docs* can be used without proper *Google* accounts, certain features would be missing: When using *Google Docs* without a student account, students are assigned random user names (e.g. “anonymous giraffe”) which change once students log out and back into the document. Students cannot use the (group) chat, can only comment anonymously, and, most importantly, changes made to the document cannot be tracked back properly (since all changes were made anonymously). At the same time, we cannot ask students to use their private *Google* accounts. Students, albeit improbable, might not have a personal *Google* account and their private *Google* account usernames also disclose their private e-mail addresses, which would then automatically be shared with the teacher and the rest of the class. As a consequence, we decided to apply for a *Google apps for education* account which provided us with a *Google admin* environment where we could create custom *Google* accounts which could carry any name and were not connected to the students’ private data in any way. A *Google* dummy account was created for each student, and

was deleted after the data collection. Therefore, no student activity in the *Google Docs* documents can be traced back to the actual students' identities¹⁶.

As mentioned before, *Moodle* is the learning management system of choice and users log in using their university campus account for authentication. Since the current, centrally run version of *Moodle* at LMU Munich does not allow for actual *Google* apps integration, the respective *Google Docs* documents (each with a unique URL) were linked to via basic HTML:

Group activity: Jessica

FIRST: Please take this **quick survey**. Thanks!

Note: Please use **Google Chrome** or **Mozilla Firefox** (do *not* use Internet Explorer - thanks!)

(Don't know your login data? Check out **this table**.)

- **Group 1**
- **Group 2**
- **Group 3**
- **Group 4**
- **Group 5**
- **Group 6**

AFTERWARDS: Please help us to improve & take part in our **EVALUATION**.

Figure 13: *Google Docs* implementation on *Moodle*.

Each link takes the students to their group documents in a new browser window. They arrive at a two-page *Google Docs* document with a series of instructions, or rather information on how to use *Google Docs* and highlights of the main features: simultaneous text editing, group chat, and commenting.

¹⁶ These precautions are motivated by data security and privacy concerns specific to the German context of this study. Privacy and data security are taken very seriously in Germany; as a consequence, education technology which might violate the very strict standards is regularly discarded by schools or universities. In an era of cloud computing (data is transferred to the internet cloud) and globalisation, it is increasingly difficult to create learning environments where all the data created or used by the students is stored locally at the institution. And even when it is possible, it is impossible for the teacher to configure, maintain, and manage such a setup.

Welcome to your group's *Google Document!*

1. Get started:
Basically, this is a word document - but all of you can work collaboratively **AT THE SAME TIME**.
Start clicking around and you'll notice your peers' cursors!
2. A few tips:
 - 2.1. CHAT:
Please **ONLY** use the text or the chat to communicate with your group. in order to open the chat click on the chat icon top right:



- 2.2. COMMENTS:
Right-click on the text and hit "comment" to put in a comment. Be sure to put your name in brackets!



Figure 14: Google Docs tutorial.

Right afterwards (still on the same page) comes the task description, providing the students with the situational context of their (still fictitious) task, their task objective and basic task parameters such as length of writing (expected word count: 300-500 words), style (business e-mail) and time frame (approximately 45 minutes¹⁷). Students are told explicitly that oral interaction is forbidden during the activity and all communication is to be carried out through *Google Docs* (chat, text, comments). This is reinforced by spreading team members across the room, thus minimising the possibility of oral interaction.

¹⁷ Time was called at the 50-minute mark, an additional five minutes was granted on top of it.

3. Your text:

Situation:
You are Dr. Merinstein, Jessica's treating physician. As you are just about to leave for a four-week vacation, you want to make sure that your holiday replacement, Dr. Lisa Cuddy, is aware of Jessica's situation as she will most likely be one of her first key patients.

Objective:
Write an e-mail (300-500 words max.) to Dr. Lisa Cuddy in which you introduce the patient, describe the presenting symptoms (complaints), provide a diagnosis and recommend a treatment plan for her. Be factual and unbiased in your professional judgement.

- **Style:** It is a business e-mail.
- **Time:** 45 minutes.

1

Start writing after the horizontal line:

From:
To:
Subject:
--

Figure 15: Google docs task instructions.

Biebighäuser et al. (2012) mention several criteria for task quality: 1. Relevance (Is the task relevant for the learners in their life/work context?) 2. Commitment (Does the task foster learner commitment as a language user rather than a language learner?). 3. Transparency (Is it clear for everybody what is expected?) 4. Focus on form and meaning (Does the task foster both language and content focus?) 5. Goal orientation (Does the task have a clear-cut goal or result which can be evaluated, discussed and integrated in the ongoing learning process?) (Biebighäuser et al. 2012: 19–25). Having these criteria in mind, I wanted to present the students with a realistic situation, for example handing over a patient to a colleague, which incorporates both analytical thinking and factual knowledge in diagnosing a patient and deciding on a treatment plan (1). As this task is very much focussed on meaning and the medical context, students are expected to behave like

language users rather than learners. Also, working in teams rather than on their own is common practice in modern medicine (2). Giving clear-cut instructions in open tasks like this seems counter-intuitive but it is effective in establishing comparability with particular parameters such as time frame and word count (3). Granted, the task has a strong focus on meaning. Yet, by providing the context and style of the e-mail, particular language-focussed aspects are emphasised (4). Finally, by providing a clear-cut goal and implementation into the course syllabus, the task should be perceived as meaningful to the students (5): Obviously, summing up patient complaints, diagnosing them, and recommending treatment in a prose-like fashion is highly ineffective in a professional environment. That is why this activity serves as preparation for introducing standardised ways of taking patient notes (patient history), focussing particularly on the use of medical abbreviations and politically correct language. The overall goal was to create a meaningful activity in the target working culture, facilitated through computer-mediated communication in order to reap the benefits of its transformative effect on student interaction as has been shown in the literature (e.g. Saville-Troike 2012: 107; Li 2012: 32; Nguyen 2013: 55–57 etc.).

Google Docs looks and works like a word processing application (like *Microsoft Word*) within the internet browser. It comes with basic formatting tools (top bar), truly simultaneous text editing facilities in the main window, a comments feature (right margin), and group chat (bottom right) (also see 2.4.2 Shared documents: Wikis 2.0, particularly Figure 8). For the purpose of this learning activity the programs interface language had been set to English, and the spell checker had been deactivated.

3.2.4 Teacher as researcher

It has to be stated clearly that the author of this thesis not only functioned as the researcher who conducted the research study in this thesis but also as the teacher of the research group. In this chapter, two research approaches which establish a strong connection between researchers and practice (namely: action research and design-based research), will be presented. In addition, possible limitations to the interpretability of the study results

caused by the aforementioned circumstances shall be presented and discussed.

Different perspectives can be taken when looking at a classroom situation which is created, taught, and researched by the same person. First, a look into the methodological literature reveals that linking classroom reality with classroom research is and has been a well-established approach to assessing, changing, and theorising teaching practices. Terms vary: “Action research”, “reflective practice”, “the teacher as a researcher” all involve “taking a self-reflective, critical, and systematic approach to exploring your own teaching contexts” (Burns 2010: 2). Or as Gebhard points out:

At the most basic level, action research is a problem-posing cyclic process, through which teachers can identify, investigate, and try to solve problems in their teaching. The cyclic process begins with a search for a teaching problem, often based on intuition and informal observations. A next step is to learn more about the problem. [...] After investigating the problem, the teacher can reflect on what has been learned, as well as guess what might happen if changes are implemented. Next, the teacher plans changes that aim at solving the problem, then implements the plan, observes what happens, reflects on the consequences, plans the next actions, and continues the cycle. (Gebhard 2005: 54)

Rather than coming up with a hypothesis which is (more or less) completely derived from and informed by theory and literature, action research puts a practical ‘problem’ at the beginning of the research process. This problem is to be solved by an almost trial-and-error approach, i.e. via implementing changes (whose effects have been theorised in advance), evaluating the actual outcome, assessing the updated state of the problem, and starting the process all over again. As a consequence, theoretical and practical tools are applied alternately rather than one following the other in a linear fashion. Burns (2010: 8) calls these four phases “planning” (1), “action” (2), “observation” (3), “reflection” (4).

Another related research approach which shares many ideas with action research, is “design-based research”. Amiel and Reeves contrast design-based research with traditional or “predictive research”, which according to them cannot do justice to the transformative nature of technology-enhanced teaching: “Integrating technologies into the classroom

leads to substantial changes in social organization, student-teacher relationships, and a myriad of other factors that cannot be investigated successfully by predictive research” (Amiel and Reeves 2008: 35).

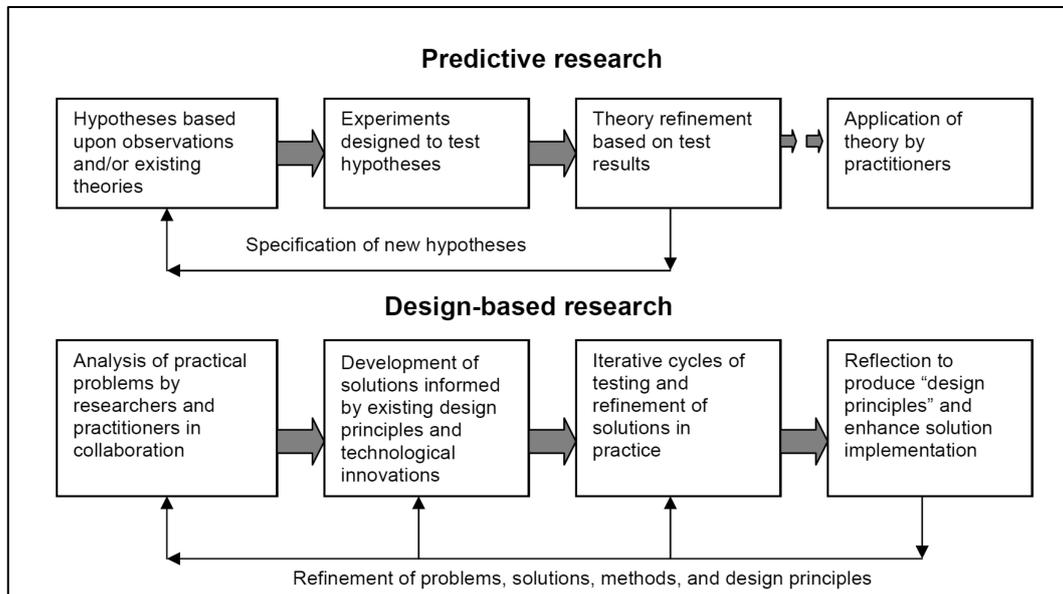


Figure 16: Predictive versus design-based research (Reeves 2008: 34).

Therefore, just like action research, design-based research puts a real world problem at the beginning of the research process and tries to solve it by implementing and assessing changes in the teaching situation in cyclical fashion. Obviously, establishing such a close link to teaching practice needs practitioners as a part of the research process, which is a novel idea compared to predictive research, where "[practitioners] are rarely part of the research design process, and are meant to reap the benefits of research when it is complete" (ibid.: 34). In the end, both action research and design-based research postulate a stronger integration of practitioners into the research process in order to identify and solve real world problems which are just too complex to "be investigated successfully by predictive research" (ibid.: 35). The key difference between action research and design-based research lies in the role of the teacher: In action research, the teacher becomes the researcher, which means he or she plays a double role. In design-based research, the teacher is an important participant in designing the research process and in implementing and assessing these changes; yet he or she is not necessarily the designated researcher in the project but rather part of a team of practitioners and researchers.

As will be discussed in detail in chapter 3.3 (data collection), being part of the research context comes with implications for the interpretability of the results. According to Deppermann, we get valid data in our recordings when the mere existence of a recording device or a person using a recording device does not influence the existence and/or quality of the phenomenon which is to be investigated (cf. Deppermann 2008: 25). Such a perspective actually negates the validity of data collected by a teacher in a teaching context as a teacher shapes the teaching context profoundly and, as a consequence, so does his or her engaging in research activities during the teaching. Deppermann, however, mitigates this radically empirical claim for 'natural data' by understanding 'natural data' as a context-sensitive concept (cf. *ibid.*). From an outside perspective, of course, classroom interaction can be perceived as highly artificial. Even in a learner-centred classroom, there are certain institutional and hierarchical realities which directly or undetectably shape classroom interaction. Yet, as it is only 'natural' in a classroom context that there is a teacher present who shapes and influences the learning process, the data gathered in such a context can be 'natural' and, consequently, provide a valid base for classroom research.

What does all this mean for the current study? First, one key principle of both design-based research and action research applies: The author of this thesis is both teacher of the research group and researcher interested in investigating the interaction processes that occur in the synchronous collaborative writing activity. Also, solving a real world problem (in this case: enabling students to collaboratively create digital text together) was the starting point of the project. However, the current study is exploratory in nature – we still understand too little about synchronous collaborative text editing (and the interaction process) to make it part of a cyclical design-based research project. In addition, the researcher being part of the research context implies limitations to the interpretability of results, as his or her presence might influence the phenomena under investigation. This, however, obviously depends on the research context and questions. I acknowledge the fact that teachers shape teaching and that their role in the teaching (and research) context has to be reflected on and accounted for. However, the

teacher as researcher in this instance had a very passive role during the synchronous collaborative writing activity, which possibly minimises his influence on the interactive practices.

3.3 Data collection

The following chapter presents how the various kinds of data were gathered, compiled to a dataset, and used for analysis. Deciding to apply one data collection approach (and discarding another), necessitates compromises. Valid data can only be achieved if the data recording approach does not (or hardly does) influence the quality of the phenomenon in question (cf. Flick 2011: 373). Luckily, “CMC tasks provide not only a means through which learners may engage in authentic interaction with others, but also a method where learner output can be monitored easily and relatively non-intrusively by teachers and researchers alike [...]” (Stockwell 2010: 83). Therefore, the built-in monitoring facilities of *Google Docs* were chosen as the primary means to gather data with a limited amount of screen recording during the activity and a short survey after the fact being the exceptions to this approach. The individual data collection instruments and their role in the data set compilation will be covered in this chapter; certain limitations or particularities of the chosen data collection approach are reflected critically in the respective chapter.

The data gathered in this study can be considered both ‘semi-natural’ and ‘semi-experimental’, similar to Katrin Lehnen’s study on cooperative text production: ‘semi-natural’, as students engaged in a computer-mediated interactive writing activity because they were instructed to do so. However, engaging in group work in a language course which is part of these students’ course of studies, can be considered ‘natural’ (cf. Lehnen 2000: 19). The data is ‘semi-experimental’ in the sense that students faced primarily two constraints: a limited amount of time and no oral communication. However, they were free to decide how to work together and which communication features to use inside the document (ibid.: 21–22).

3.3.1 Primary data

This section covers the primary data source of this study: *Google Docs*. After a description of the three communication channels of *Google Docs* (chat, text, comments) and their intricate workings, their compilation into a comprehensive data set is explained. Using *Google Docs* and its built-in

retrieval facilities can obviously only capture what happens inside that one browser tab. Students' use of other digital resources outside of the *Google Docs* document was not recorded as a consequence. Theoretically, students were able to use online dictionaries, browse *Facebook*, or copy and paste data into the document from a different resource without the data showing it directly. At least in the case of copy and paste, the revision history of the text indicates when big portions of text are added to the document within a minute by a single user; often students actively ask for some data from their notes to be copied into the document by a group member. The task design (and the teacher presence) eliminated face-to-face communication for the most part, yet video recordings from the room could have provided a backup in case face-to-face communication had taken place.

All descriptions of *Google Docs* and its features relate to the state of the software in August-September 2014 in Germany. Web-based software changes constantly and there are no official or publicly announced versions of the program. Shortly after the data had been collected, a new "suggest edits" function was introduced. When activated, it turned every single text edit made in the document into a suggestion, marked in the text and displayed in the right margin of the document. The suggested edit can be accepted, rejected, or commented on (just like the comments feature):

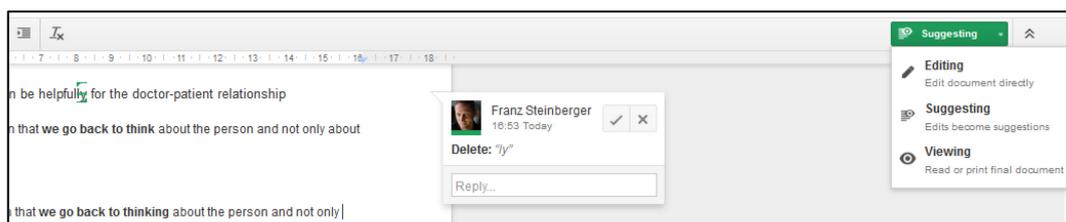


Figure 17: "Suggest edits" function in *Google Docs* (2017).

Clearly, the availability of such a function would have changed the interaction dynamics to some extent. Still, it is assumed that this function, just like the comments feature, caters more to asynchronous use cases and is not as crucial for synchronous collaboration as the chat, for instance.

3.3.1.1 Chat log

Google Docs offers a (group) chat facility which allows users to easily exchange ideas, coordinate their collaboration or simply chat recreationally. Users enter the chat automatically when entering the document. The chat

window appears on the bottom right (again, cf. figure 4, bottom right) and can be minimised by users. As soon as somebody makes a contribution to the chat, however, the chat window pops up again. Before sending a message to the group chat (or sending a comment to the right margin of the document for that matter), users may enter their proposed text, re-read it and possibly edit it before sending¹⁸. All this activity cannot be tracked without screen-recording technology (on every participant's computer) and was not recorded. As a consequence, only the students' final versions of their chat contributions and comments which they saw fit for sharing have been recorded and can be used for analysis. Chat activity is recorded by the minute only, i.e. every chat contribution from 10:51:00 to 10:51:59 counts as a chat contribution at 10:51 o'clock. Yet, all chat utterances are recorded in the right order.

Retrieving the chat log is not straight forward for several reasons. First, in piloting the data collection of this study, it was found that the group chat data is only kept alive as long as there is at least one member of the group in the document. This can also be the teacher/researcher who observes the activity by being part of the document. As soon as everybody has left the document, the group chat data is gone. Therefore, the group chat conversation must be copied and pasted into another document right after the activity. Second, when copying text from the chat window into a *Microsoft Word* document, any emojis, i.e. "[...] any small image used to express emotion or ideas in electronic messages" (Steinmetz 2014: 49), e.g. ☺, were not displayed at all. Only by pasting the chat into a plain text editor, could the information be retained. However, the emojis were converted into emoticons made with punctuation; so, the aforementioned smiley face emoji (☺) was turned into :-). This again shows that the data collection (and its analysis) can represent the actual collaborative experience of the participants only to a certain extent.

¹⁸ This is not a distinctive feature of the chat (or comments) feature in *Google Docs* but rather a common phenomenon in computer-mediated communication tools.

3.3.1.2 Text revision history

Google Docs comes with a built-in text revision history feature which keeps track of changes made to the document by any user at any time. "Each iteration is an automatically saved and automatically numbered version (every 11 seconds) of the document; thus, an iteration could be a change to a word, sentence, paragraph, and so forth" (Kessler et al. 2012: 95). These iterations are tagged with the time when they were entered. They are not numbered to the second but to the minute, so if there are more than one change in one minute, several consecutive iterations under the same minute mark are displayed in the right order (yet without an exact time stamp). Changes to the text are recorded and displayed in a rather unfiltered manner: Whenever a user starts typing, the letters, words, phrases are recorded right away and, later on, displayed as changes made by user XY (marked in a particular colour in the revision history of the text); this includes any type of self- or peer correction. This is not the case in the chat and comments sections of the document where users can type text into the chat or comments form and check it before hitting the send button.

The 'final text' is merely the last saved change made to the document. The (temporarily) final state of the document can be rolled back all the way to the blank page it once was. The actual changes made to the text are colour-coded in order to differentiate between changes from different users. In the text retrieval process of this study, I realised that these colour schemes (user A is assigned green, user B is assigned red etc.) change from session to session. As a consequence, all the iterations from one group document had to be extracted in one sitting which could take several hours.

3.3.1.3 Comments

Like any regular word processor, *Google Docs* comes with a comments feature which allows users to comment on portions of the text. Users highlight a portion of the text using the mouse cursor, right-click it and select "Comment". A prompt in the right margin of the document appears where they can enter text and send it. From that point onwards, the comment is displayed in that part of the document, carrying the author's name (cf. figure 4, top right). Once a user hovers over the comment with the mouse, the

portion of the text which is linked to that comment is highlighted in the colour assigned to the author of the comment. Users can then reply to that comment or hit “Resolve” which closes the comment and deletes it from the margin. Comments can also be traced back to the user who created them and the time when they were entered. Once “resolved”, archived comments can be viewed (and restored if necessary) by selecting the “Comments” button at the top right of the document.

3.3.1.4 Compiling the dataset

CMC research often fails to capture the whole range of student interactions for a number of reasons: Either the task design has an asynchronous element (like non-recorded face-to-face meetings of the students) or meta-communication is simply not recorded as it would be time-consuming to both record and transcribe student interaction outside of the actual text document. That is why this project aimed to capture all the possible interactions in the CMC environment to paint a complete picture of the synchronous collaborative process. As oral face-to-face interaction was basically negated by the task design, all communication took place within the three communication channels of the *Google Docs* document, that is in the text, in the chat, and in the comments. As this study aims to describe the collaborative process as a whole across the aforementioned communication channels (rather than isolated to the respective channels), a chronologically organised dataset was created by merging the retrieved data from all three channels into one comprehensive document. This resulted in a table with four columns (“Time”, “Chat”, “Text”, and “Comments”):

Group 1: Chat-Text-Comments (19.7.2014)
 Imgard Apfel - Renate Hiss - Tanja Portlanger

II. Collaborative process

Time	Chat	Text	Comments
10.51		<p>Start writing after the horizontal line:</p> <hr/> <p>From:Dr. Merinstein To:Dr. Lisa Cuddy Subject: --</p>	
10.52	Renate Hiss 10:52 AM so how are we going to do this?? should we just seperate the email into parts??		

Figure 18: Compiled dataset for analysis.

As can be seen in Figure 18, the table depicting the collaborative process is organised chronologically. Whenever there was activity in the chat, text, and/or the comments section of the document, this contribution was put into a line in the table according to the time it was entered. The colour coding scheme was carried over from the text revision history. Since the group chat was extracted in plain text without any colour coding, the students' (dummy) names in their respective colours were put into the page header for easy reference during data analysis. The data collection resulted in a total of 582 A4 pages of data, approximately 73 pages per group, on average.

3.3.2 Secondary data

This section covers the secondary data sources of this study. 'Secondary' implies that these data sources, like the final texts for instance, are considered additional instruments to interpret the primary data.

3.3.2.1 Texts

Eight texts have been collected as the result of the collaborative activity. The texts are the last iteration of the collaborative process and were extracted from the collaborative documents after time had been called. With an average of approximately 367 words per group, most groups managed to stay within the suggested text length of the text (300 to 500 words maximum, cf. Figure 15: *Google docs* task instructions.):

	G1	G2	G3	G4	G5	G6	G7	G8	Average
Words	373	266	294	417	290	534	421	340	366,875

Table 2: Word count of the co-authored texts.

In order to avoid bias and reduce the effects of the teacher being the researcher of this study, the eight student texts were corrected and marked by another teacher (who also teaches the course on a regular basis and is a native speaker of Canadian English).

3.3.2.2 Surveys

The participants were asked to complete two online surveys, one before the activity and one after the fact in order to gain insights into their experience and views regarding working together synchronously in written computer-mediated form. The surveys were carried out anonymously using *Google Forms* and student entries were transferred automatically into a *Google* spread sheet. The first survey covered only basic biographical data: age, sex, country of origin, and mother tongue(s). Also, the students had completed the Oxford Online Placement Test prior to the course, so their approximate language level according to the Common European Framework of Reference (CEFR) was known.

The second survey, which was to be completed immediately following the collaborative writing activity, covered the students' prior experience with shared documents technology, and their actual experience working together. It also provided room for critique. The questions were organised in three focus areas:

Focus area	Question	Question type
1. Prior experience	1a. Have you ever used <i>Google Docs</i> OR similar tools before?	Closed
	1b. Have you ever worked on a text with somebody at the same time (= synchronously) using <i>Google Docs</i> or similar tools?	Closed
	1c. If you answered question 1b with "Yes": Which collaborative tools have you used?	Open
2. Task	2a. The time for the task was...	Multiple

evaluation		choice ¹⁹
	2b. Were the instructions clear?	Scale ²⁰
3. Task experience	3a. How did the synchronous nature of the task (everybody can write/chat/comment at the same time) affect your group work?	Open
	3b. If you could change the way this task (= write an email together with the help of 1-2 colleagues) was carried out: How would you do it?	Open
	3c. How would you (possibly) use this kind of synchronous collaborative technology in your private or personal life?	Open

Table 3: Post-activity survey design.

The first triad of questions (1a, 1b, and 1c) were meant to give an insight into students' prior experience with web-based word processing tools and shared documents technology in general. Questions from group two (2a and 2b) were about the actual task the students had to complete. The open questions of group three were about the experience of working together synchronously (3a), room for improvement (3b), and student assessment of possible real-life applications of such technology (3c).

The data gathered in the surveys (and the placement test) provide a data-driven basis for interpreting the results of the analysis of the collaborative process. Once again, the obvious limitations of asking participants about their communicative practices have to be considered (also cf. Deppermann 2008: 21): Participants might answer according to social desirability (both cultural and situational) and the students' self-interpretations of their interactive practices are admittedly just their interpretations. However, the students' own accounts of their collaborative experience can point towards data points worthy of further analysis in the dataset of the collaborative activity.

¹⁹ Possible answers were "too long", "too short", "just right".

²⁰ The scale ranged from 1 ("not clear") to 6 ("very clear").

3.3.2.3 Screen recording

As soon as reality is documented by transcribing oral conversations or by turning the synchronous collaborative activity into the aforementioned compiled data set, a different version of that reality is created which does not necessarily resemble the experience the participants had. However, such a transformation of actual reality into accessible material is inevitable in order to facilitate research (cf. Flick 2011: 383–384). Reconstructing the synchronous collaborative text creation process by rolling back the document in (approximately) one-minute increments, and aligning the text changes, comments and chat contributions chronologically in one long document makes the process transparent and analysis feasible. However, the data thus seen differs greatly from the collaborative experience the students had. That is why screen recording software (*Camtasia Studio* from *Techsmith*) was used to record six random five-minute clips of the teacher screen with the internet browser set to one of the groups' documents. As every single document carried a unique internet address (URL), eight separate browser tabs were opened (one tab = one document per group), enabling the teacher to scroll through those tabs in order to monitor group activity somewhat unobtrusively.

The videos were created primarily to document the synchronous nature of the collaborative process and to understand how students experienced the activity – which is rather difficult if the dataset compiled from the chat log and text revision history is the sole base for analysis. A screenshot from one of the screencast videos reveals a number of differences between the dataset used for analysis and the actual situation:

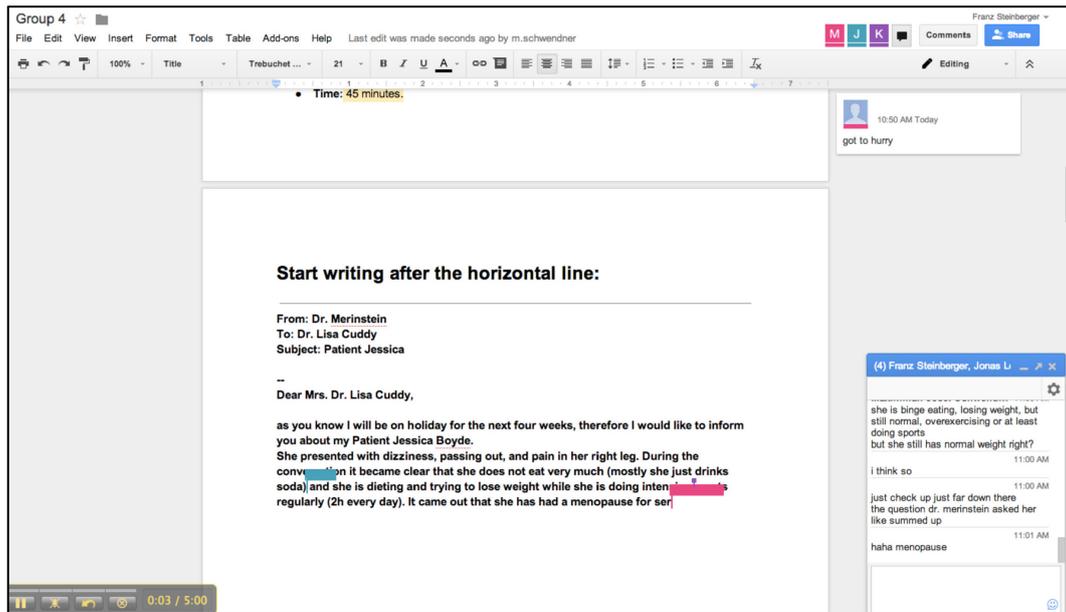


Figure 19: Screenshot from a screencast video.

First, the chat window stays open even when the last entry was several minutes before. In the data compilation, by contrast, the chat contributions are aligned with the text and comments according to their time of contribution. As a consequence, a recent chat contribution is not present in the compiled dataset when text edits have been made in the meantime. Of course, it is always possible to go back in the dataset and see if/how the chat relates to the current portion of text but it requires an extra step.

Second, neither the compiled dataset nor the screen recording video represents what students actually saw on their screens. Each user was able to scroll in the document, and even if a student is observed entering text on the screen, it cannot be assumed that they are seeing that exact same portion of the screen. Therefore, without using eye tracking or recording every student's screen individually over the whole course of the activity, it is impossible to comprehensively document students' behaviour when they were not entering text, making chat contributions or entering comments. Activities like scrolling through the text, clicking into the text with the cursor, and reading behaviour can only be assumed as this information was not recorded.

Third, changes made to text are not colour-coded during the actual activity. The collaborators' cursors are colour-coded, however, and carry their author's name on top. (Collaborators are assigned colours when joining

the document.) Cursor movement is not tracked at all in the revision history, yet contributions, i.e. actual edits made to the text, are colour-coded, which enables tracking text edits of individual users ranging from adding a comma to changing whole paragraphs.

Given the amount of information one can gather by using screen recording software, one could argue that this technology should have taken centre stage in the data collection approach taken in this study. Yet, improving the quality and level of detail of recordings inevitably introduces a higher level of intrusion which makes the situation 'unnatural'. We can collect valid recordings only when the recording itself does not influence the existence and quality of the phenomenon which is being investigated (cf. Deppermann 2008: 25). Recording 20+ student screens simultaneously on video using (costly) screen recording software would cause a series of issues: It is not a trivial undertaking to make sure that the recording starts on all computers at the same time and keeps running as long as required; controlling all recordings from a central machine would be difficult. Surely, having 20+ hours (45 minutes per student times 24 students) of recordings would provide interesting additional data, e.g. the clicking behaviour of students or their internet research behaviour outside the *Google Docs* document. Yet, a setup like this would have complicated the dataset massively: Video data has to be transcribed at some point. Depending on the required depth of data and the complexity and length of the recordings, this can prove to be a very demanding and time-consuming endeavour. Even a minimal transcription of the video material of 24 students in a 45-minute activity would require an enormous effort. Additionally, this study aims at exploring the collaborative practices by primarily looking at what is uttered (and what is not) in a multimodal computer-mediated environment; the intricacies of computer-mediated communication (clicking and scrolling behaviour) are not the focus here; that is why screen recording would not have provided a clear-cut surplus. Although students were aware that the teacher could access their documents and observe, the activity resembled a standard classroom situation rather than a lab-like setup. It is expected that this balance between the ease of data collection and the level of detail may

inspire other (language) teachers to both incorporate shared documents in their teaching and carry out research projects of their own.

3.3.3 Terms of participation

3.3.3.1 Informing the students

Prior to the actual collaborative activity, the participants were informed of the following:

- During the activity, the teacher can observe all participants' written activity in the *Google docs* documents at all times.
- All data (revision history, comments, chatlog, evaluation results) will be entirely anonymised, analysed, and used for publication in a research study.
- Data collection is primarily text-based.
- Participants can opt out of the computer-mediated collaborative writing activity and complete it 'offline' instead without penalty. (All students chose to participate in the computer-mediated activity.)

Lastly, it has to be added that this study does not aim to establish a connection between learners' individual differences such as age, language proficiency or learner biography and their collaborative behaviour. This study is limited to describing the collaborative process as it emerges from the written data.

3.3.3.2 *Google Apps for Education* and data privacy

With the advent of technology in the classroom, data privacy has become an issue for educators and students alike. This especially holds true for web-based activities where users constantly share information over the internet in order to interact with each other. The situation becomes particularly difficult when commercial software or services are used for student collaboration, which also applies to this study. The *Google* apps suite which caters for a number of use cases aside from collaborative writing is free of charge only on a surface level. Users need a *Google* account to gain access to its products, which again is free only at first glance; *Google* gathers and analyses its users' activities (search queries, websites users visit, videos users watch etc.), user-generated content (e-mails, calendar entries, photos, videos, documents etc.), and personal data (name, e-mail address, date of

birth, sex, phone number, nationality etc.). All this information can be found on *Google's* dedicated data privacy site²¹, where it also claims to use the data primarily to enhance the user experience by offering a more personalised and hence fluent web experience. On the very same site, *Google* also states, yet less prominently, that this data is also used to personalise advertisements in order to target advertisement effectively. In other words, the trade-off for using the free, commercially available product is forfeiting personal data.

Private citizens can choose whether or not to use a product or service. However, it becomes a problem to use a seemingly free product in the classroom where student data is gathered and stored on US servers and analysed for advertisement purposes. The language centre of Munich University therefore applied for a *Google Apps for Education* account, which is free of charge for educational institutions. Similar to *Google's* services tailored for businesses, *Google Apps for Education* grants educators an administration environment to create (anonymous) user accounts at will, control user rights and set up collaborative spaces such as shared documents with *Google Docs*. As a consequence, users do not have to surrender personal data and, according to the *Google Apps for Education* privacy statement²², there are no advertisements at all. These anonymous user accounts were deleted after the data had been compiled into the final data set for analysis. The evaluation survey did not cover any so-called 'special kinds of personal data' like ethnicity or race, political opinions, etc.²³. According to the German *Rat für Sozial- und Wirtschaftsdaten*, an independent council of data scientists and public servants, data anonymisation is successful if the data has been altered to such a degree that it is either impossible to identify the actual person behind the data or that it would be disproportionately time-consuming to establish this connection (cf. Liebig 2014: 7). It is therefore believed that the data of this study has been anonymised to a sufficient degree.

²¹ See <https://privacy.google.com/your-data.html> (accessed: 07 December 2016).

²² See <http://www.google.de/apps/intl/de/edu/privacy.html> (accessed: 07 December 2016).

²³ „[...] [Besondere] Arten personenbezogener Daten [sind] Angaben über die rassische und ethnische Herkunft, politische Meinungen, religiöse oder philosophische Überzeugungen, Gewerkschaftszugehörigkeit, Gesundheit oder Sexualleben“ (Liebig 2014: 21).

3.4 Data analysis

In this chapter, the data analysis approach of this study is explained. The main data source is the ‘interactive text’, i.e. the compilation of data gathered from the text revision history, the chat logs, and the comments section of the respective groups’ documents. The two other data sources, i.e. the final texts including the evaluation and the participant survey are considered auxiliary data sources to interpret or point towards interesting data points in the compiled data of the collaborative process.

3.4.1 The final texts

The products of the collaborative writing activity (final texts) were graded according to three criteria, which were equally weighted and resulted in a total grade for task fulfilment:

- **Content:**
Is all the relevant information, both medical and patient-specific present? Is the information correct?
- **Language:**
Is the language correct? Is the language used appropriate for the task requirements (formal business e-mail, professional judgement)?
- **Organisation and Structure:**
Is the e-mail structured in a consistent and meaningful way according to the task requirements? (introduction of the patient, present complaints, proposed diagnosis and treatment plan)?

This study focusses on the process (not the product) of synchronous computer-mediated collaboration. Although it is not strictly necessary to look at the product in order to assess the process, the final texts can be considered the last step of the process and, hence, part of it. Also, in the spirit of action research and design-based research, a learning activity which is the subject of scientific scrutiny should be a successful and purpose-driven learning activity by itself (without the research aspect). In order to judge an activity with regard to its purpose and success, it is inevitable to look at the outcome of the activity. This assessment of learner performance serves first and foremost as background information and proof of task completion. It can,

however, be viewed as an additional means to interpret the outcome of the process analysis.

3.4.2 Communication channel usage

In order to get a general impression of the usage patterns of all groups engaging with synchronous shared documents technology, their channel usage is analysed with regards to time spent in the respective communication channels (chat, text, comments). This part of the data analysis is meant to provide a basis for answering research question one: How do groups of L2 students use the three communication channels of *Google Docs* in a synchronous group writing activity?

First, an analysis of total time spent in the respective channels is carried out on a global and a group level. Second, the synchronous usage of channels is investigated. The (presumably) diverging patterns of channel usage, both in terms of quality and quantity, serve as a background for the analysis of discussion episodes (3.4.3 Discussion episodes). Also, the analysis shall provide interesting insights into how students engage with complex multi-modal technology when confronted with a challenging language task.

3.4.2.1 Global communication channel usage and synchronous usage

In order to get a global understanding of how participants engaged with the task by means of synchronous shared documents technology, activity in all three available communication channels is analysed in terms of time spent in the respective channels. Time, i.e. minutes, as the unit of measurement is chosen deliberately as the built-in recording facilities of *Google Docs* record changes to the document or general activity by the minute (cf. 3.3.1.2 Text revision history). Participant activity is first analysed on a global group level, i.e. each time there is activity in the group chat, the text or the comments section, it is recorded as such. Such activity could be one person making a chat contribution at minute two or all three people editing text synchronously at minute twelve. These different types of activity would be recorded as one instance of chat activity at minute two and one instance of text activity at minute twelve. As a consequence, this global description of channel usage does not yet account for synchronous channel usage. The following excerpt from the compiled dataset (cf. 3.3.1.4 Compiling the

dataset) and the corresponding part of the resulting visual overview of communication channel activity across groups illustrate this process:

Time	Chat	Text	Comments
10.51		<p>Start writing after the horizontal line:</p> <hr/> <p>From:Dr. Merinstein To:Dr. Lisa Cuddy Subject: --</p>	
10.52	<p>Renate Hiss 10:52 AM so how are we going to do this?? should we just seperate the email into parts??</p> <hr/> <p>Tanja Portlanger 10:52 AM Guess we could do that</p> <hr/> <p>Irmgard Apfel 10:52 AM we could if we agree on the diagnosis</p>		

Figure 20: Recording global communication channel activity; excerpt from the data set of group one with a snippet of the data analysis on top.

All groups started the task at slightly different times (in this case: 10:51); for comparability, these differing start times have been adjusted, so every group starts at minute one. As can be seen in Figure 20, two additions in the text (here: sender and recipient of the e-mail), have been recorded as “text activity at minute one”. The three chat contributions have been recorded as “chat activity at minute two”, and so on. Therefore, every instance of activity means that, at that point in time, one participant (or two or three) was active in the chat, the text, or the comments section of the document. This analysis enables several global observations:

1. How much time do students need in order to complete the task?

As the last instance of activity marks the end of the task, this overview also shows the total time needed to complete the task.

2. How much time do groups spend in each communication channels in relation to their task completion time?

The second data point illustrates how much time groups spend in the respective communication channels, providing a clearer picture of how participants engage with synchronous shared documents technology.

3. How much overlap is there, i.e. how often is there activity in the chat and the text (and the comments) at the same time?

Looking at the amount of overlap between chat activity and (primarily) text activity is particularly interesting from a collaboration-cooperation point of view. Whenever there is activity both in the text and the chat section of the document, it can be seen as some division of labour, a clear indication of the cooperative pattern.

4. Which channels are used in the different phases of the collaborative process?

This questions aims at identifying channel preferences at certain points in the collaborative process. This distribution of channel preferences is particularly relevant when compared to what was actually communicated by the participants (cf. 3.4.3 Discussion episodes).

3.4.2.2 Communication channel usage on a group level

As a second step, channel activity is looked at on a group level, i.e. instances of activity are recorded individually, resulting in a fairly detailed account of participant activity in all three communication channels. The aforementioned excerpt from the dataset (cf. Figure 20) is used to illustrate this more detailed approach to recording activity:

Time	Chat	Text	Comments
10.51		<p>Start writing after the horizontal line:</p> <hr/> <p>From:Dr. Merinstein To:Dr. Lisa Cuddy Subject: --</p>	
10.52	<p>Renate Hiss 10:52 AM so how are we going to do this?? should we just seperate the email into parts??</p> <hr/> <p>Tanja Portlanger 10:52 AM Guess we could do that</p> <hr/> <p>Irmgard Apfel 10:52 AM we could if we agree on the diagnosis</p>		

Figure 21: Recording communication channel activity on a group level; excerpt from the data set of group one with a snippet of the data analysis on top.

Again, times have been adjusted to account for different task start times across groups. Also, students have been assigned numbers in order to be distinguishable. As can be seen in Figure 21, the two text changes at 10:51 are still recorded as one instance of activity as they are both made by the same person (same colour). The three chat turns at 10:52, however, are recorded as three instances of chat activity as all three participants were involved. This more detailed analysis of channel usage helps answer the following questions:

1. How much time do participants spend together in the chat and the text (and comments) respectively?

The more detailed record of channel activity enables us to find and count instances of joint chat, text, and comment activity or, in other words: How much time do participants spend in the chat, the text, or the comments section at the same time?

2. How much of an overlap is there between time spent in the chat and the text?

The per-participant approach of recording channel activity enables us to see if and how often students work both in the chat and the text at the same time. Just like in the global observation of communication channel activity, such quasi-division of labour can be seen as a metric for a cooperative approach to task completion.

3.4.3 Discussion episodes

As students were to solve a complex task in a relatively short time span, they had to focus their communicative capacities and decide which aspects of the activity ‘merited’ discussion with their peers and which did not, i.e. answering research question two (“What do small groups of L2 students (not) focus on in their task-related meta-discussions?”). This investigation is meant to reveal important implications for activity design and, possibly, desirable features for future iterations of web-based word processing tools. In order to describe the topics covered in the discussion episodes, possible taxonomies for describing discussion episodes in collaborative writing (taken from the literature) shall be discussed as a starting point to create a taxonomy suited for describing the data set of the current study.

3.4.3.1 Discussion of existing taxonomies

As has been demonstrated before (cf. 2.4.3 Collaborative L2 writing with technology: related research studies), the perceived majority of research on collaborative writing with technology seems to focus on the text as a product or a process but tends to disregard the meta-communication around the actual focus of collaboration. Possible reasons are manifold; in asynchronous collaborative writing scenarios (wikis mostly) which may last for weeks, the meta-communication takes place outside of the classroom and is hence very difficult if not impossible to monitor for the researcher. Groups might meet in real life or not at all. It is difficult to capture the process of collaborative writing in its entirety without introducing some degree of artificiality to the task setting. Three select studies on computer-mediated collaborative writing which dealt with discussion episodes around the actual writing shall be discussed with regard to the respective taxonomies used to describe what was discussed by the students.

In her 2005 study, Neomy Storch (Storch 2005) pursues a rather classic research aim of collaborative writing research: She compared (hand-written) texts produced by individuals and texts produced by groups (pairs) in terms of task fulfilment, grammatical accuracy, and complexity. She also tried to shed light on the collaborative writing process of group writers by audio-taping and analysing their pair dialogues (cf. Storch 2005, 155ff.). The coding of discussion episodes worked as follows:

"[...] [All] dialogues were examined for any distinct phases of writing: planning, writing, and revision phases. The time spent on these phases was noted. Then all talk was segmented into episodes. An episode varied in length from a single turn to a number of turns. Each episode was coded for what the learners seemed to focus on." (ibid.: 158–159)

Storch's inductive approach to finding suitable categories for describing the collaborative process evident in the pair talks resulted in seven "focus areas" (Storch 2005, 159) or categories:

Focus area		Example
Task clarification	Episodes where learners read or discuss the given instructions	Y: right on do we have to write it ? or just a tell E: just a tell no writing... Y: if we write then it can?t record it (Y&E, lines 5-8)
Generating Ideas (GI)	Episodes where learners generate and reformulate ideas	A: most of the Vietnamese J: of the Vietnamese speak a little English? A: can ... J: can speak a little English (A&J, lines 67-70)
Language related episodes (LREs)	Episodes in which the learners deliberate over lexical or grammatical choices (see Swain & Lapkin, 1998)	O: Figure 3 shows that there were Vietnamese and Laotians participate S: participating O: participating S: is correct? O: ah ... because there were we are using there were (O&S, lines 16-21)
Structure	Episodes where learners focus on the organization of ideas	M: first we describe C: describe the before first after that we should compare M: describe after that yeah after that we talk about ... we describe this (C&M, lines 42-46)
Interpreting Graphic prompt	Episodes dealing with clarification of the information in the graph	N: the percentage ... the percentage is about thirty ah ... it is about forty percent R: forty percent ... is it? N: yeah forty for advanced and forty for intermediate (N&R, lines 158-160)
Reading/ re-reading	Episodes in which the learners simply read or re-read the text they had composed	V: Figure 1 shows the comparison of English speaking skills for the Vietnamese and Laotians before they came to Australia and now ok... (V&T, lines 54-55)
Other	Episodes dealing with issues such as writing conventions and task management	C: perhaps you should write M: yeah I write (C&M., lines 14-15)

Figure 22: Coding of discussion episodes (Storch 2005.: 159)

As can be seen from the table, some “focus areas” are clearly task- or task-context-specific: “Interpreting graphic prompt” refers to the data commentary text the students were asked to produce (cf. Storch 2005, 156). “Reading/re-reading” or “Episodes in which the learners simply read or re-read the text they had composed” can only be monitored to such a degree in a face-to-face situation and are therefore not applicable to our present study which was carried out exclusively in a computer-mediated fashion.

The second study to be discussed investigates the online L2 writing behaviour of advanced Dutch learners of German as a second language. In Carola Strobl’s 2014 study, learners carried out a series of individual and

collaborative writing tasks over the course of four weeks. Strobl aimed to find out (1) what influence online collaboration has on the final text in terms of complexity, accuracy and fluency (CAF) and (2) how online collaboration impacts the writing process in terms of writing and reviewing patterns, both compared to individual writing (cf. Strobl 2014, 2ff.). The medium of choice was, as in our present study, *Google Docs*. Unfortunately, most students in Strobl's study "clearly preferred to use their usual text editor, and subsequently cut and pasted their individual contributions, or even their complete final drafts, into the *Google Docs* editor" (Strobl 2014, 6). As a consequence, revision activities of most texts could not be retrieved using *Google's* built-in revision history feature. Instead, Strobl was able to analyse the groups review activities in the comments section of the documents and an online forum (cf. Strobl 2014: 4).

"Following Kessler et al.'s (2012) subdivision of contributions in collaborative learning situations, nine of the twelve established topic categories refer to language-related contributions (LRCs), while the other three refer to non-language-related contributions (NLRCs): layout questions, workflow and appraisal. Table 4 shows an overview of the contribution topics in order of frequency." (Strobl 2014, 7)

Topics covered in the student interactions were listed according to their frequency:

% of total (n=119)	Mean / group	Topic	Type	Remark
22.4*	3.38	<i>Morphology, incl. morphosyntax</i>	LRC	Discussed in all but 1 group
17.6	2.63	<i>Style</i>	LRC	Best performance group: 29% of total
14.3	2.13	Content	LRC	Best performance group: 32% of total
12.6	1.88	<i>Lexical choice</i>	LRC	Discussed in all groups
9.2	1.38	<i>Orthography and punctuation</i>	LRC	Discussed in 4 (/8) groups
8.4	1.25	<i>Cohesive ties choice</i>	LRC	Discussed in 4 (/8) groups
5.9	0.88	<i>Syntax</i>	LRC	Discussed in 4 (/8) groups
3.4	0.50	Coherence	LRC	Discussed in 3 (/8) groups
2.5	0.38	Workflow	NLRC	Meant to be discussed in forum
2.5	0.38	Semantics	LRC	Discussed in 2 (/8) groups
2.4	0.38	Layout etc.	NLRC	Discussed in 3 (/8) groups
1.7	0.25	Appraisal	NLRC	Only in best performance group

* Italicized items relate to meaning-preserving changes (LOCs)

Figure 23: Taxonomy of discussion episodes (Strobl 2014: 8)

Strobl draws the basic distinction between language-related contributions (LRCs) and non-language-related contributions (NLRCs). She further distinguishes between language-related contributions which alter meaning (non-italicised, like “Coherence”) and language-related contributions which preserve meaning (italicised, like “Lexical choice”). This amounts to a total of twelve topic categories, nine of which are language-related and three non-language-related. When comparing Strobl’s taxonomy to Storch’s (2005) differentiation of “focus areas” it must be noted that Storch picked seven categories, from which only one category describes language-related discussions, namely “language-related episodes”; she refers to one of the textbook definitions of a language-related episode “[...] as any part of a dialogue in which students talk about the language they are producing, question their language use, or other- or self-correct” (Swain 1998: 70). This approach is in stark contrast to Strobl’s rather elaborated taxonomy where nine out of twelve categories deal with “language-related contributions” or “LRCs”: morphology/morphosyntax, style, content, lexical choice,

orthography and punctuation, cohesive ties choice, syntax, coherence, and semantics (cf. figure 11).

The third and final taxonomy to be discussed is taken from Amirkhiz et al.'s work on language-related episodes in collaborative writing (Amirkhiz et al. 2013). As the name of the study suggests ("EFL/ESL Learners' Language Related Episodes (LREs) during Performing Collaborative Writing Tasks"), it deals exclusively with language-related episodes of four dyads of students (groups of two, eight participants in total) creating text collaboratively in face-to-face meetings at a private university in Kuala Lumpur. Their discussions were audio-taped and then analysed. Students met for fifteen sessions, eleven of which were analysed. The purpose of the study was to compare how two Iranian student dyads (ESL) and two Malaysian student dyads (EFL) reflected on their language use during a collaborative writing activity (cf. *ibid.*: 473 ff.). The learners' language-related episodes were put into three categories:

Form-oriented language-related episodes (FO-LREs): episodes on grammatical accuracy dealing with form and tense of the verb, the articles, prepositions, linking devices and word order.

Lexis-oriented language-related episodes (LO-LREs): episodes dealing with word choice, word meaning, or alternative ways of expressing an idea.

Mechanics-oriented language-related episodes (MO-LREs): episodes dealing with spelling, pronunciation, and punctuation. (cf. *ibid.*: 476)

With its three categories of language-related episodes, Amirkhiz et al.'s (2013) differentiation of language-related episodes sits in the middle compared to Storch's (2005) one type and Strobl's (2014) nine types of language-related episodes.

Obviously, different taxonomies for describing student interaction in a collaborative setting arise from different research aims (exploring the collaborative process vs. comparing products) and different task configurations (face-to-face interaction vs. computer-mediated communication, asynchronous vs. synchronous interaction, dyads vs. groups of three, etc.). That is why, none of the aforementioned studies can serve as the sole basis for the data analysis of the current study.

3.4.3.2 Taxonomy of discussion episodes for this study

Our current study differs from the aforementioned projects in a number of ways: As students worked together synchronously and only via *Google Docs* (no face-to-face communication), all meta-communication took place primarily in the group chat portion of the documents. Only groups two and four used the comments feature. Using the question mark (“?”) in the text portion of the documents, often in brackets after a word or expression which the participant was unsure of, functioned as a pointing device to mostly linguistic or content-related problems. As a consequence, the group chat is the main area of interest. However, the comments section and portions of the text section have to be considered when analysing discussion episodes of the document. This leads to a cross-channel description of discussion episodes where, e.g. a language-related discussion on lexical choice might cross all communication channels within the document (chat – text – comments). In the following, the categories used to describe the discussion episodes in the current study shall be presented and illustrated by examples. In the spirit of Philipp Mayring’s content analysis (cf. Mayring 2010: 20–21), decisions to include, change, and adapt certain categories and to discard others were purely based on the dataset. After each of the aforementioned taxonomies had been tested on the dataset individually, combinations of categories from all three taxonomies were tested. After several rounds of testing, I have arrived at the following taxonomy of discussion episodes, which is inspired by Amirkhiz et al.’s (2013), Storch’s (2005), and Strobl’s (2014) work and modified by the author:

Discussion episodes: Focus areas				
Type	Focus area	Code	Description:	Utterances about/containing...
Language	Form-oriented language-related episodes	FO-LRE	Grammatical accuracy on a surface level: form and tense of the verb, form of adjectives, adverbs, articles, linking devices, nouns, prepositions; punctuation,	

			spelling, syntax, word order.
	Meaning-oriented language-related episodes	MO-LRE	Word choice, translations, words' meanings, style, register, alternative ways of expressing an idea, lexicogrammar.
	Layout	L	Visual layout and text formatting: Bold, italics, underlined, headings, lists.
Content	Content	C	Patient history, patient diagnosis, treatment plan, re-reading and re-watching activities.
	Content structure and coherence	CS	The logical structure of the e-mail: where to put what in the text, sequence of ideas/content.
Social	Workflow management	WM	Task management, delegations of (sub-) tasks (who does what), negotiating and implementing a work plan.
	Small talk	ST	Greetings, general appraisal and critique, gratitude, humour, unspecific remarks.
Discussion episodes: Meta-level tags			
Type	Tag	Code	Description
Language	German / L1 usage	G	Words, phrases, clauses, sentences in German.

	Emoticons, emojis and humour	E	Usage of emoticons, emojis, and humorous expressions.
Channel usage	Text section	T	Discussions which take place in the text section of the document.
	Comments section	COM	Discussions which take place in the comments section of the document

Table 4: Taxonomy of cross-channel discussion of the current study.

Strobl's (2014) basic distinction of language-related and non-language-related discussions has been adopted as a basic distinction. Also two of her categories, "workflow management" and "layout", have been adopted, and slightly adapted. Storch's (2005) category "structure" has been included, but with a different description or function. Finally, Amirkhiz et al.'s (2013) sub-categorisation of language-related episodes has been adapted by reducing their three sub-categories to two categories with different names and more comprehensive descriptions: The category "lexis-oriented language-related episodes (LO-LREs)" has been changed to "meaning-oriented language-related episodes (MO-LREs)"; the category "mechanics-oriented language-related episodes (MO-LREs)" has been eliminated by incorporating "spelling" and "punctuation" into the category "form-oriented language-related episodes (FO-LREs)"; "pronunciation" has been discarded as there is no oral face-to-face communication in this study's data. On a global level, "type" differentiates between discussion episodes related to the categories "language", "content", and "social". "Focus areas" are the categories to be allocated to the actual discussions in the document. These categories are partly inspired by the aforementioned taxonomies but have been either renamed or adapted to cover more or different discussion items (see "description"). As can be seen from the descriptions, the "focus areas" are highly context-dependent and informed by the data.

Discussions assigned to the “language” category deal with both form- (“form-oriented language-related episodes”) and meaning-oriented (“meaning-oriented language-related phenomena”) language phenomena, first and foremost so-called “language-related episodes”:

"[The construct of language-related episodes] has since been used in classroom research to identify the degree to which language learners address recently learnt or problematic features of the target language, allowing for the systematic categorization of these episodes by researchers. [...] Research into LREs provides increasingly fine-grained analyses of learner productions, subcategorizing LREs as meaning-based, grammatical, orthographic, or according to varying degrees of negotiation for meaning“ (Jackson 2001: 298).

These language-related episodes range from surface-level issues, such as “How do you spell this?”, to more complex issues like “I think this sentence should be more formal”. Discussions about “Layout”, i.e. formatting of the text, also fall under the category of “Language”. Whenever participants discuss content questions (“Content”), i.e. the patient history, or questions regarding the structuring of content within the actual text (“Content coherence and structure), these discussions were put into the category “Content”. Finally, students had to discuss how to tackle the collaborative task in the given time frame using only written CMC facilities to interact with each other. These discussions fall into the category “Social” with either discussions about “Workflow management” (who does what etc.) or “Smalltalk”.

The section “Meta-level tags” contains two category types: “Language” and “Channel usage”. The category “language” contain the two categories “German / L1 usage” and “Emoticons, emojis, and humour”. “Channel usage” contains the two categories “text section” and “comments section”; these two categories refer to the two other communication channels available, apart from the chat section where, presumably, the major part of discussion happened. All four meta-level tags are not considered “focus areas” but can be seen as additional information tags attributed to utterances on top of their “focus area” mapping. These meta-level tags shall provide insights into when (i.e. talking about which topics) participants choose to switch to their mother

tongue, add affective qualities to their utterances, or take discussions directly to the text or the comments section.

In an attempt to create the categories from a participant perspective, the categories have become rather broad and include some seemingly random items. An attempt has been made to strike a balance between a purely abstract linguistic taxonomy and a mere collection of phenomena. This becomes most apparent in the focus area “meaning-oriented language-related episode”, which encompasses surface-level lexical issues as well as complex questions of alternative ways of expressing ideas. Although questions such as “How could I say this differently in English?” might lead to both surface-level formal changes as well as complex syntactic considerations, this distinction is quite unlikely to be made by students who ‘just’ want to create text together and wonder how to say something differently. That is why broader categories have been chosen.

Utterances, i.e. primarily chat turns with a timestamp from the respective participants, were assigned one of the aforementioned “focus areas”. The following chat contribution is labelled “Content” / “C”:

Group 5	11:25	Anne Gras: and didn't she state, that she mostly has salad for lunch? or am I making that up? and she didn't always use a condom, did she?
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The participant refers to the patient history and looks for confirmation from her peers. However, not all chat contributions at a certain time are one-dimensional as students also cover several topics within a single chat contribution using a variety of language means:

Group 5	11:32	Anne Mauer: aaaaah let's do a conclusion xD
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Here, the call for action (“let's do a conclusion”) is labelled as “Workflow management”/ “WM”. Finally, the exclamation and the emoticon “xD” are labelled “Emoticons, emojis, and humour”/ “E”. Therefore, this rather short

utterance carries two focus area tags: “Workflow management” and “Emoticons, emojis, and humour”.

It has to be noted that, in the spirit of Deppermann’s conversation analysis (cf. Deppermann 2008: 54), utterances are not treated as isolated phenomena but analysed in relation to their surroundings. The following utterance, when looked at in isolation, would be labelled as “small talk”/”ST” according to our taxonomy as it is an unspecific remark/instance of appraisal:

From group 2:

Time	Chat
10:54	Jule Botzel: sounds good!

However, it is preceded immediately by an utterance of another participant which makes the classification rather clear:

Time	Chat
10:53	Norbert Korezko: how about we sum up her symptoms on the bottom and after that, writing the email?
10:54	Jule Botzel: sounds good!

As soon as we consider context, it changes the categorisation entirely. It could be argued that this treatment of utterances as connected phenomena judged by their interactive consequences (cf. Deppermann 2008: 54) introduces some degree of subjectivity. Nevertheless, when considering the participants’ actual behaviour in the documents, we still analyse overt, surface-level phenomena without trying to look into people’s minds. As a consequence, both utterances are labelled “workflow management”/ ”WM”. Strictly speaking, individual turns are labelled according to their immediate surroundings by author interpretation. These individual turns then become coherent episodes. This approach is necessary in a computer-mediated setting, particularly with more than two participants, as so-called “disrupted adjacency” becomes quite apparent:

[D]isrupted adjacency [...] is a common consequence of chat interaction, especially when multiple participants are involved, and several disjoint conversations can be interleaved, sometimes with overlapping participation from common participants. Messages in

chat are ordered sequentially, depending on who hit the “send” button in what order; users do not necessarily intend to interrupt one another when messages appear out of sequence. Users also must employ context to determine if a turn was actually completed. (Paolillo, John C. & Zelenkauskaitė, Asta 2013: 120)

In other words, it becomes necessary to take individual turns rather than episodes as a starting point for description as it is entirely possible that there are two conversation threads happening at the same time within a few minutes.

Finally, as was mentioned at the beginning of this chapter, these discussion episodes can take place across communication channels. Although it would be expected that discussions take place primarily in the chat portion of the *Google Docs* document, actual technology usage might differ greatly from the usage scenarios interface designers (or educators for that matter) had in mind. Students might, for example, initiate a meaning-oriented language-related episode (MO-LRE) directly in the text instead of verbalising it in the chat portion of the document, e.g.:

From group 3:

Time	Editor	Text
11:02	Matthias Ronberg	She is not too keen? on talking about her sexuality.
11:04	Felicitas Kester	She is not comfortable too keen? on talking about her sexual activity.

In this portion of text, Matthias marked the word “keen” with a question mark in order to indicate some degree of uncertainty. Following Depperman’s approach once more, the utterance is not investigated in isolation but with regard to its communicative consequences (cf. Deppermann 2008: 54), which follow two minutes later. Another student, Felicitas, supplies an alternative directly and without any discussion in the chat or comments part of the *Google Docs* document. This can possibly be seen as the minimal manifestation of a language-related episode, where “[...] students talk about the language they are producing, question their language use, or other- or self-correct” (Swain 1998: 70). So, although this episode

took place in the text and not the chat, it was marked accordingly as students indicated a need for discussion. Nevertheless, the distinction between a mere text edit, e.g. changing the spelling of a word, and the subtle invitation to give feedback by placing a question mark next to a word in the text remains debatable. It can nevertheless be seen as a distinctive feature of synchronous, multimodal, computer-mediated collaboration.

All the above-mentioned observations also hold true for the comments section of the *Google Docs* document. In order to comment on the text, students have to mark a portion of the text with the mouse, right-click it, and enter a comment into a text box which appears in the right margin of the document. This typically asynchronous feature of the web-based word processor opens up a quasi-forum with only one thread which people can reply to.

From group 4:

Reference in the text	Time	Comments
When talking about her physical activity she mentioned the pain in her right knee, the pain could be treated with iceing after the training and occurs after longer runs.	11:06	Joseph Lehmuss: proposed diagnosis?
	11:07	Joseph Lehmuss: I didnt get that in the video
	11:08	Karina Durman: he didnt propose a diagnose Karina Durman: he said he'll look at it during the exam

Here, the group engages in a content discussion (labelled as “content”/“C”) about the video input prior to the activity using the comments feature in *Google Docs*.

This cross-channel description of discussions provides an insight into which aspects of the collaborative process students deem worthy of explicit discussion with their peers. This question is particularly interesting in a task setting where time is a very limited resource and typing, the only means of interaction, takes up more time than speaking. Also this investigation can show which aspects of the collaborative endeavour are not deemed worthy of

discussion by the students; a glimpse into the revision history of the text can then provide information on whether the focus areas not covered in the discussions were not present at all or just not negotiated explicitly. Meta-level tags provide additional information on the usage preferences and intricacies of synchronous collaborative writing.

3.4.3.3 Selective inclusion of text revision activity

The text revision history of *Google Docs* is more complicated than the chat log or the comments history of the documents. Chat turns in the chat log are recorded according to the time when they were sent. When there were three chat contributions (by three users) at 10:58, they were recorded as being sent at 10:58 in the natural order (= as sent by their contributors). However, the creation of the message (i.e. the typing of individual letters before hitting the 'send' button) is not recorded. The same holds true for comments: When a participant entered a comment in the document at 11:04, the comment was recorded as being sent at 11:04 by that user. When looking at asynchronous wikis, it should be noted that "[...] simultaneous editing is not possible in traditional desktop word processing programs, wikis, or other synchronous tools where the user must wait for interlocutors to complete their turns before they have access to each other's text" (Kessler et al. 2012: 100). The saved iterations of wikis work somewhat like chat contributions or comments from a data recording point of view. A saved iteration of the wiki might include one or many actual changes by one user. Such changes "[...] could consist of changing a letter, word, sentence, paragraph or the entire wiki" (Kessler and Bikowski 2010: 45). However, the process of the user coming up with the changes, i.e. the process of typing them into the wiki page, is not recorded. Only the final iteration is saved and can be viewed in the page history of the wiki.

The revision history in *Google Docs* behaves quite differently: "[...] In Google Docs users see their collaborators' text appear as it is being written" (Kessler et al. 2012: 100). While this creates the decisive feature of *Google Docs*, i.e. the ability to edit text collaboratively in simultaneous fashion, it makes the revision history also infinitely more complex:

that previously occurred during physical exercise. She participates in her school's track and field's team and is being trained by her father. She's very ambitious and exercises on a daily basis, unconcerned about effects on her health. Her training attitude is fortified due to her father's high expectations and rewarded by appreciation of her success. When she presented in my office with her father they were complaining about her having fainted twice during exercise within the past two weeks. She said fainting always came along with a feeling of dizziness. When asked about her da

FAs for her treatment i would suggest a cognitive-cognitiv-behavioral-therapy, done as a family therapy and although in sessions with other affected patients. Hthf

Figure 24: Extract from Google Docs revision history (group 1, minute 32).

Since users do not have to wait until another user is finished editing the page, both the creation of text and the revision of text happens simultaneously (not to mention the dynamics of three rather than one user editing simultaneously). As a result, it becomes basically impossible to differentiate between text creation and revision in a synchronous collaborative writing activity in *Google Docs*. Granted, there are several instances where users do not work in the exact same spot:

She also mentioned drinking a lot of diet coke. Jessica admitted having vomited once or twice after eating. She is not aware of this being a problem for her health.

For her treatment I would suggest a cognitive-behavioral-therapy, done as a family therapy and although in sessions with other affected patients. Her father has to: Her weight must be under close monitoring. Also her nutrition should must be reconvered and her exercises must be decreased.

Figure 25: Extract from Google Docs revision history (group 1, minute 34).

As can be seen from Figure 25, students write in safe working distance from each other. Still, as text creation and revision activities are so closely intertwined, they cannot be separated in a meaningful and feasible way. Also,

contrary to chat contributions (where students are interacting with each other in a visible fashion) it becomes impossible to see whether participants notice peer activity in the text (when, for instance, on a different page) without additional data (screen recording). That is why instances of revision activity are picked selectively to broaden the insights gained from the analysis of the discussion episodes (cf. 3.4.3 Discussion episodes). When a discussion episode in the chat revolves around a language phenomenon in the text, the following or preceding revision activity in the text is taken as a data point to comprehensively describe the language-related episode in question. However, it was deemed unfeasible to code and categorise the entire revision history of the text for the aforementioned reasons.

3.4.4 The participant perspective

The mere size of the data provides ample opportunity for extensive qualitative analysis, even with the (rather open) research questions providing some guidance. It is therefore deemed necessary to include the participants' perspective for two reasons: Firstly, it will provide some focus in the data analysis. The open questions of the post-activity survey are expected to help students point towards phenomena of the collaborative process worth investigating in the dataset. Secondly, as has been stated earlier, the primary dataset is a compilation of different data sources. To some degree, it is an abstraction of the actual collaboration and does not necessarily reflect the experience of the students working together synchronously. Gaining insights into the participants' actual experience may prove very useful in interpreting and understanding the data of the collaborative process. In this chapter, the qualitative analysis approach of the participant surveys is presented.

3.4.1.1 Pre-activity survey: Basic biographical data

The pre-activity survey covers only the basic biographical data: sex, age, country of origin, and mother tongue(s). This information is collected and presented to provide some context for the study without any implications for the interpretations of the results.

Participants were asked to create a four-letter code for their dummy user name, which was entered in the post-activity survey to allocate survey

replies to dummy user names. At this point, however, it is no longer possible to establish a connection between the dummy user names and the actual students. This approach was chosen for data privacy reasons.

3.4.1.2 Post-activity survey: Prior exposure, task judgement, activity experience

The post-activity survey contains three categories of questions. The first triad is about the participants' prior experience with shared documents technology. Answers to the first two Yes/No-questions (1a and 1b) were tabulated and compared. Answers to the open third question (1c) were clustered and counted. This information will provide a clearer picture of the participants' technology expertise.

The second group of questions revolves around the basic task design, i.e. task time and instructions. The task setting inevitably influences student behaviour, so students' judgement of the envisaged task time (question 2a) and the instructions (2b) can provide further input for interpretation of the results.

The third group of questions finally addresses the students actual experience working together. All three questions are open questions. As Mayring suggests (cf. Mayring 2010: 69), answers were reduced to their basic meaning and tagged accordingly. These tags emerge exclusively from the data, which means they were created inductively – that is why the coding scheme is discussed in chapter four. When asked in question 3a “How did the synchronous nature of the task (everybody can write/chat/comment at the same time) affect your group work?”, one participant replied “very helpful” (cf. Appendix, 7.4.6 Survey question 3a). This answer is tagged with the category [POSITIVE], indicating general positive feedback. Another student replied “it was funny ;) we could work great together and help each other out with grammar, vocabulary or structure”; it is tagged with the category [POSITIVE] but also with the category [LANGUAGE-RELATED PEER FEEDBACK], indicating both general positive feedback and rather specific feedback on the seemingly technology- and task-inherent affordances regarding language-related peer feedback. As a consequence, a single student

answer may contain several tags. These tags were then counted, clustered and visualised.

4 Results and discussion

In this chapter, the results of the data analysis are presented. Although the primary research interest lies in the collaborative process of groups of L2 students co-authoring a text, the product of their collaborative effort (the final texts) are discussed first in order to have a point of reference and an additional data point to interpret findings of the three research questions. As each research question corresponds with a dedicated step of data analysis, research questions one, two, and three will be answered by the analysis of communication channel usage, discussion episodes, and the students' perspective respectively. The last chapters lay out a few limitations of this study.

4.1 The final texts

As has been argued earlier in the methods chapter (cf. 3.4.1 The final texts), this study does not primarily aim at investigating the final product of the collaborative activity but at describing and analysing the process. However, the final co-authored texts are not discarded entirely. First, it is believed that only an activity which makes sense from a pedagogical point of view and results in a somewhat successful product is worth investigating in the first place. Second, discrepancies in the groups' task fulfilment success can point to or explain phenomena investigated in the process analysis. With an average of approximately 367 words per group, most groups managed to stay within the suggested text length (300 to 500 words maximum, cf. Figure 15: *Google docs* task instructions.)²⁴:

	G1	G2	G3	G4	G5	G6	G7	G8	Average
Words	373	266	294	417	290	534	421	340	366.9

Table 5: Word count of the co-authored texts.

Group texts were graded according to three criteria (content, language, coherence and structure), which were equally weighted and resulted in a total grade for task fulfilment, with a one being the best possible grade and a six being the worst:

²⁴ The usual +/- ten percent are taken into account.

	Structure & Organisation	Content	Language	Task fulfilment (= total)
Group 1	3	3	3	3
Group 2	3	3	1	2
Group 3	3	3	1	2
Group 4	3	3	1	2
Group 5	3	3	2	3
Group 6	1	1	1	1
Group 7	2	3	2	2
Group 8	1	2	1	1
Mean	2.4	2.6	1.5	2.0

Table 6: Grading collaborative writing activity.

The mean grades of the activity suggest that students organised their written products well, performed a bit weaker in content creation, and performed exceptionally well in the language area, resulting in a mean of 2.0 as the total grade for task fulfilment.

Language, as the best category with a mean grade of 1.5, refers to the students' performance in both grammar and vocabulary but also references other aspects such as appropriate style and register as set by the task description. Most (of the few) language issues were related to lexical choice and occasional orthography problems. The average language proficiency level of the student cohort was C1, according to the Common European Framework of Reference (CEFR)²⁵. This might explain the generally high level of performance here (with only one group scoring a three and five groups scoring a one). One of the questions pursued in the analysis is to see whether groups who performed well in the language area reflected more or less frequently on language use in the discussion episodes (see 4.3 Discussion episodes).

Content, as the 'worst' category with a mean grade of 2.6, refers to two aspects: 1. To what degree did the groups incorporate information they were explicitly asked to include in the task description (e.g. introducing the patient, proposing a diagnosis, etc.)? 2. To what degree did groups

²⁵ The language level of the students was assessed by means of the *Oxford Online Placement Test* prior to the course (cf. <https://www.oxfordenglishtesting.com>; accessed: 01 June 2017).

incorporate correct information on the patient and her symptoms from workshop one and online phase one? Groups who scored a three in this area did not double-check the information on patient history by, for example, watching the short videos again (which they were explicitly allowed to do). This resulted in them giving inaccurate information about the symptoms or leaving out some aspects of the present complaints. At first glance, this could say more about the students' diligence regarding their homework (reading scientific articles on the symptoms) than the collaborative activity. However, the willingness to look things up also depends on task time – in a 45-minute activity, where only typing is allowed, time is a valuable resource and perhaps the students' priorities precluded the double-checking of information in videos or texts. Again, it will be interesting to see whether groups who did not score as well in the content category spent more or less time discussing content questions.

Finally, Structure and Organisation refers to the groups' ability to structure the e-mail in a meaningful way according to the task requirements (introduction of the patient, present complaints, proposed diagnosis and treatment plan). Group two, for instance, included bits of diagnosis while still describing the patient's present complaints – two aspects of a patient handover which should be separated to avoid bias. Group three interjected a comment regarding drug use, which was totally out of place in that part of the text. Again, it will be interesting to see how much time students dedicated to discussing content structure in the discussion episodes.

To conclude, all groups performed reasonably well in the collaborative activity. There were no huge discrepancies. In identifying the 'best' and 'worst' performing groups, groups six and eight appeared to score the highest and groups one and five the lowest. Yet, given the rather high language proficiency level of the participants, even a three indicates a generally satisfying level of task fulfilment. As such, the grades given do not provide many interesting insights by themselves, but serve rather as data points worth looking into to interpret the analysis of channel usage and discussion episodes in the following chapters.

4.2 Communication channel usage

Research question one asked: “How much time do small groups of L2 students spend in the three communication channels of *Google Docs* in a synchronous group writing activity?” When there are different computer-mediated means of interaction and no oral face-to-face interaction, it is worth investigating how this special communicative challenge is solved by the participants. Research question one aims at describing the global channel usage of groups of participants in that collaborative writing activity. In other words: How did students distribute their precious task time across the communicative facilities provided in *Google Docs* (chat, text, comments)? Activity in all three available communication channels was analysed in terms of time spent in the respective channels. Time, i.e. minutes, as the unit of measurement is chosen deliberately as the built-in recording facilities of *Google Docs* record changes to the document or general activity by the minute. This analysis will serve as a backdrop to understanding the intricacies of synchronous collaborative writing in a computer-mediated fashion. It will also inform the analysis of discussion episodes and the analysis of the students’ perspectives on this way of working together.

4.2.1 Global communication channel usage: time spent on editing vs. interaction

As described in chapter 3.4.2.1 Global communication channel usage and synchronous usage), whenever there was activity in any of the communication channels (chat, texts, comments) by any group member, it was noted as activity in that channel at that minute. Consequently, activity could mean one chat turn by one team member at minute ten or three text edits by two different team members at minute twelve. Although this record of channel activity is rather basic and to some extent inaccurate (as it subsumes different types of activity of different group members into mere activity at a given time), it can provide a general overview of how participants used this type of technology to interactively create text together. The record of channel activity resulted in the following figure:

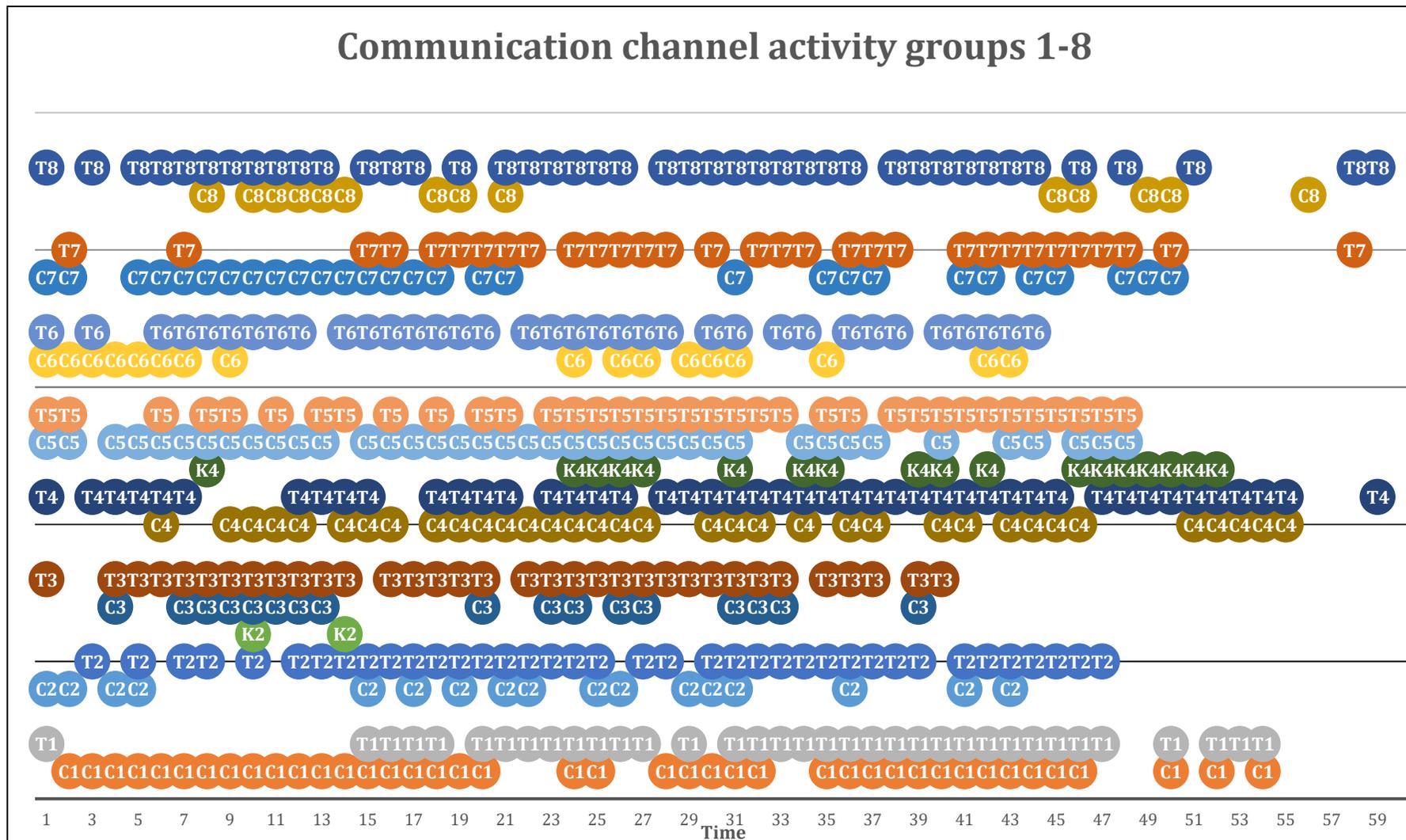


Figure 26: Communication channel activity groups 1-8 (schematic representation).

Figure 26 depicts group activity across the three communication channels in the course of the activity in a schematic fashion. The x-axis depicts activity time, starting at minute one and going all the way to minute 59. The letters C, T, and K stand for chat, text, and comments respectively. The numbers next to the letters indicate group numbers one to eight. Therefore, all coloured circles carrying a one next to a letter indicate channel activity of group one (the orange and grey circles at the bottom). All circles carrying a two indicate channel activity from group two (the light blue, dark blue and bright green circles above group one) and so on. Whenever there is one circle on top of another circle (in the same group), it indicates that there was activity in both channels. At minute fifteen (and the following four minutes), for example, there is a grey T1 one circle on top of an orange C1 circle; this indicates that at minute fifteen (and the following for minutes) group one both chatted and worked on the text simultaneously²⁶.

A number of general observations can be made based on this schematic representation of channel usage in the collaborative writing activity in *Google Docs*: First, channel activity varies greatly among groups, both in terms of sheer quantity (for instance, how much time groups spent chatting or editing) and the order of occurrence. The following example illustrates this:

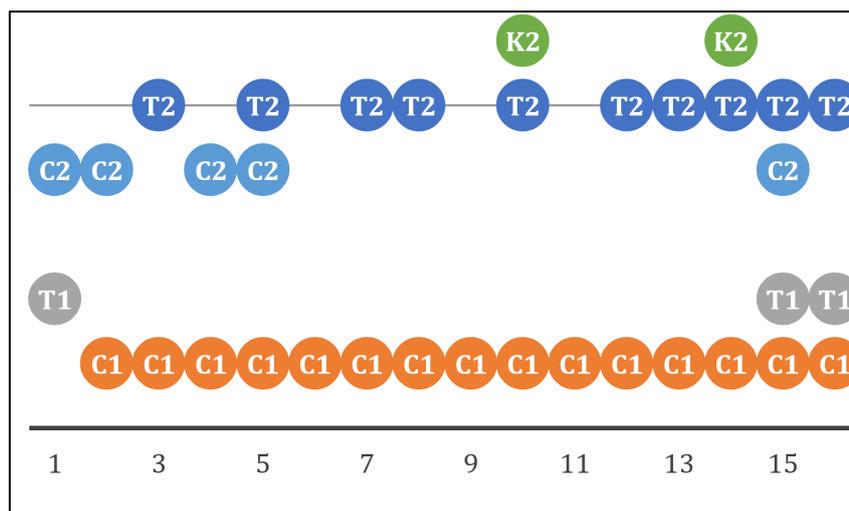


Figure 27: Extract from communication channel activity (groups one and two).

²⁶ Since this is an abstraction on a group level, one indicator of chat activity could mean one, two, or three people chatting at that minute.

Groups one and two display an entirely different channel usage behaviour in the first fifteen minutes of the activity. After some initial chatting, group two (blue) heads straight into the text and starts writing. In contrast, group one (blue) barely touches the text portion of the document until minute fifteen (except for minute one). This results in entirely different amounts of time spent in the respective channels. In the first sixteen minutes, group one spends only three minutes making text edits, whereas group two spends ten minutes making edits. The opposite holds true for chatting: Group one spends fifteen minutes chatting, group two just four minutes. Also, group two uses the comments feature (which group one does not). Interestingly, there are some instances of parallel channel activity in both groups where there is both chat and text activity within the group at the same time. At least on the surface, this points to some division of labour as one group member might still be chatting with a peer while another group member is working autonomously on the text. It remains to be seen in the data whether such division (which could be called a cooperative pattern²⁷) actually takes place. Differences among groups become even more apparent when looking at the numbers behind Figure 26: Communication channel activity groups 1-8 (schematic representation).

²⁷ “[...] [C]ooperation can be achieved if all participants do their assigned parts separately and bring their results to the table; [...]” (Kozar 2010: 17).

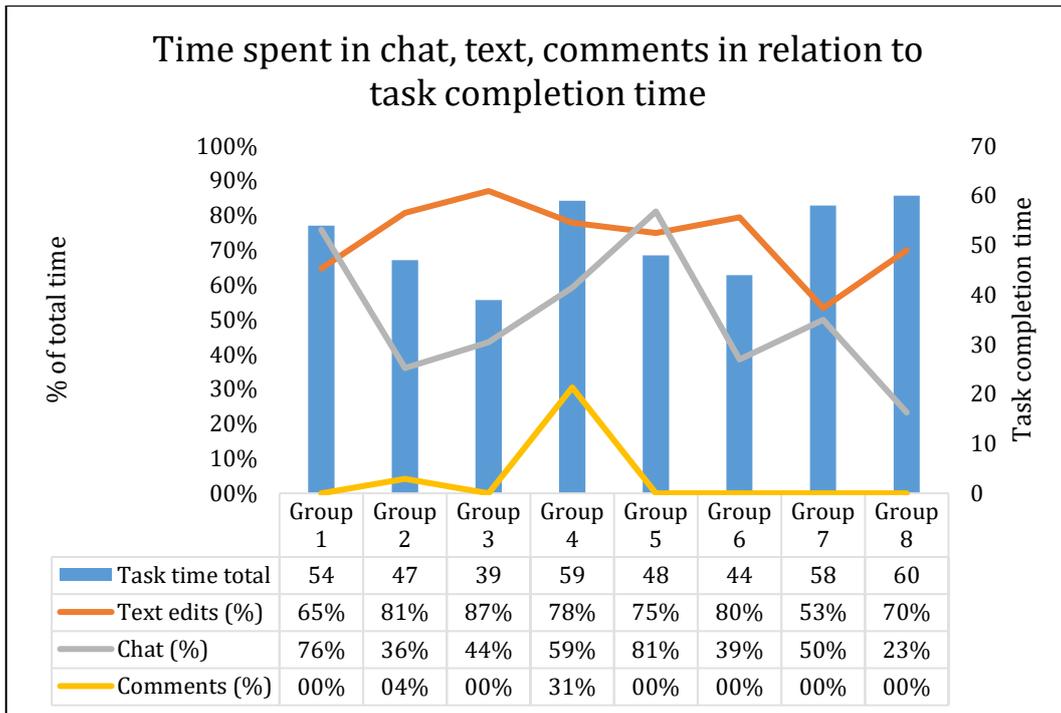


Figure 28: Communication channel activity groups 1-8 (figures)²⁸.

“Task time” is a straightforward metric, indicating the time it took every group to finish the task. While it took the majority approximately 51 minutes, there are three groups which needed (almost) 60 minutes and one group which just needed 39 minutes to create a joint text²⁹. In other words, the projected task time of 45 minutes might have been too short. “Text edits (%)”, “Chat (%)”, and “Comments (%)” indicate the percentage of the total task time the groups (i.e. one, two, or three group members at this time) spent on editing text, chatting, or entering comments respectively. More than half of all groups (median) spent 76.5 percent of their task time on text edits, while both the average and median of chat contributions are around the 50-percent mark. The differences in chat usage seem more pronounced than in time spent on text editing. Four groups (groups two, three, six, and eight) spent 43.5 percent or less (and as low as 23 percent) of their task time on chatting, while the other four groups (groups one, four, five, and seven) spent

²⁸ The percentage numbers of text edits, chat activity, and comments do not add up to 100 as they depict activity on a group level, i.e. instances when, for example, one group member was making changes to the text while the other two group members were engaged in chatting would be added to both the text edits and chat metric.

²⁹ Task time was called at the 50-minute mark, but an additional five minutes was granted. Since there was no way to shut down the documents, student activity persisted up to the 60-minute mark in some groups.

50 percent or more (and as high as 81 percent) of their time on chatting³⁰. Comments were only really made by group four, which is not surprising as comments, by design cater more to asynchronous scenarios where chat cannot be used as a meta-communication tool.

Interestingly, as can be seen from Figure 28, the two groups who dedicated the most time to chatting (group one: 76 percent; group five: 81 percent), also dedicated equal amounts of time to editing text. Their high chat engagement did not impact their dedication to editing text, at least from a quantitative point of view. The opposite seems to be true for the majority of the remaining groups where high levels of text engagement are accompanied by lower levels of chat engagement. There is yet another correlation (yet not a causality at this point) worth mentioning: Both groups one and five, who spent a comparatively large amount of time on chatting, scored worst in terms of grades in the final texts (cf. Table 6: Grading collaborative writing activity.), whereas groups six and eight scored best among the cohort. Both groups six and eight dedicated considerably less time to chatting than groups one and five did (39 and 23 percent vs. 76 and 81 percent). Does this indicate that high chat engagement lead to worse performance in a collaborative writing activity? With a sample size this small and without looking at what the vast amount of chat time was actually spent on, such a generalisation cannot be made. This observation, however, will be kept in mind for the analysis of discussion episodes in chapter 4.3 Discussion episodes). Only then can we judge whether the correlation between a high level of chat engagement and scores in the final texts might be causal or a coincidence.

Looking at the absolute numbers (rather than at proportions of the total amount of time spent)³¹, presents a rather pleasant picture of participation levels concerning exposure to and usage of the L2:

Group	User	Chat	group avg.	Text	group avg.	Comments	group avg.
1	Irmgard Apfel	28		17		0	
	Renate Hiss	33		22		0	
	Tanja Portlänger	35	32	18	19	0	0

³¹ Here, the participation levels are broken down into individual participants. Still, the prime interest lies in investigating student behaviour on a group level.

	Jule Botzel	9		35		2	
	Norbert Korezko	10		20		0	
2	Susanne Rach	5	8	19	24.6	0	0.6
	Matthias Ronberg	7		14		0	
	Felicitas Kester	10		23		0	
3	Louisa Rufenbach	8	8.3	18	18.3	0	0
	Karina Durman	21		29		9	
	Joseph Lehmuß	20		23		10	
4	Markus Schwarz	17	19.3	25	25.6	4	7.6
	Anne Gras	28		17		0	
	Anne Mauer	25		18		0	
5	Sabine Salus	23	25.3	33	22.6	0	0
	Henriette Gabel	11		27		0	
	Martina Mahwi	8		28		0	
6	Sandra Sole	10	9.6	18	24.3	0	0
	Matthias Gerber	11		22		0	
	Marwin Merklin	11		20		0	
7	Anna Schulnitz	24	15.3	18	20	0	0
	Sabine Herold	8		30		0	
	Elisa Norad	10		31		0	
8	Julia Vait	9	9	22	27.6	0	0
MEAN		15.9		22.8		1	

Table 7: Communication channel activity in minutes.

Given an average task fulfilment time of 51.1 minutes, 41.7 minutes (approximately 82 percent) were spent on average per student either chatting or contributing text to the document. Such a high level of active participation in an L2 can be considered a probable site of L2 development. Producing, reflecting on, negotiating and, in turn, taking in large quantities of topic-related language material in a short period of time is indeed conducive to language development. Again, participation varies across groups and within groups but, at least from a quantitative point of view, there were no 'free riders' relying entirely on their peers' work. All participants engaged in the task to a relatively even degree.

Overall, channel usage varied among groups. Whereas the majority of groups spent an average of approximately 74 percent of their task time on actually co-authoring the text with relatively little variation (53 to 87 percent), chat usage varied considerably. Group five, for example, dedicated 81.2% of their task time to chatting, whereas group eight spent only 23.3% of their task time on chatting. Commenting, as has been mentioned above, is not

worth investigating here as it was hardly used. Looking at the absolute numbers (minutes spent in the respective channels), it appears that all participants engaged actively and, at least from a quantitative point of view, had many opportunities to perceive, produce, and negotiate L2 material – a prerequisite for L2 development.

4.2.2 Synchronous communication channel usage: cooperation or collaboration?

Synchronous activity within one communication channel or across all three communication channels promises to be an interesting data point as it is more or less bound to happen in a synchronous collaborative writing activity facilitated by shared documents technology. With three people per group, it is possible to have two people discussing a content or language feature of the text, while the third group member is busy making that (or another) change to the text. From a theoretical point of view, such observations can lead to an understanding whether groups engage in a more cooperative or collaborative mode of working together. Two different types of synchronous channel activity within the eight groups occurred in the data set and are investigated in this chapter: overlap of chat and text activity (1) and synchronous text editing by two or more participants (2). On the one hand, synchronous activity in the text portion of the document would be expected to point to collaboration: “[...] [C]ollaboration [...] implies direct interaction among individuals to produce a product and involves negotiations, discussions, and accommodating others’ perspectives” (Kozar 2010: 17). On the other hand, overlap of chat and text activity point to cooperation: “Co-operation usually implies either splitting up the work or solving subtasks individually and combining the results into a final product” (Scanlon 2000: 464–465). At least from a social learning point of view, collaboration seems to be a better condition for learning than group members solving sub-tasks independently from each other (cf. Judd et al. 2010: 342).

First, instances of group level activity in the chat and the text portion at the same time were identified and counted. For comparability, the result in minutes was then converted into a proportional amount of time in relation to the task completion time. Group one, for example, had twelve minutes of

chat-text overlap. With a total task time of 54 minutes, this resulted in approximately 22 percent of the total task time with chat-text overlap³². The following figure depicts the chat-text overlap in relation to the total task completion time on a group level:

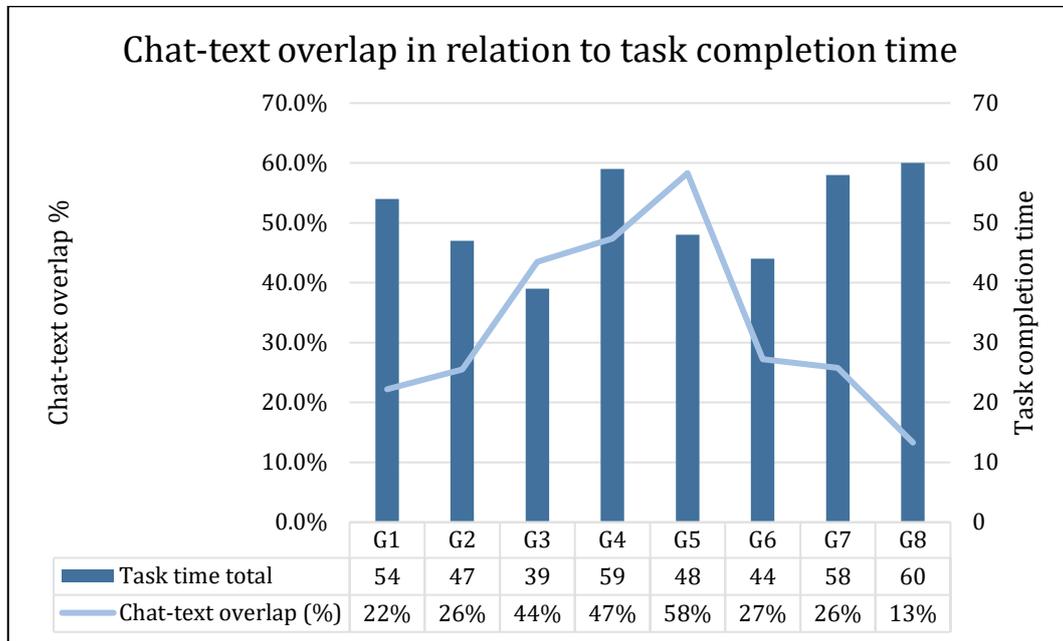


Figure 29: Chat-text overlap groups 1-8

As can be seen from Figure 29, chat-text overlap, i.e. instances where there is activity both in the group chat and the text portion of the document, is a frequent phenomenon in synchronous collaborative writing with shared documents technology. There was an average of approximately 33 percent of chat-text overlap per group with the extremes being 13 and 58 percent. In other words, during one third of the task duration, there were people engaged in writing the actual text and chatting about it at the same time. Theoretically speaking, this could imply that participants were engaged in cooperation rather than collaboration during that time since activity in different communication channels implies that participants focussed on different aspects or sub-tasks of the activity in different communication channels. Yet, closer scrutiny of the actual data sets presents an entirely

³² All this information can be extracted from Figure 26: Communication channel activity groups 1-8 (schematic representation)..

different picture. The following extract from group five's dataset³³ shows that it can be problematic to derive collaborative patterns from sheer numbers:

11.17	<p>Anne Gras 11:17 AM it don't think it's bulimia btw anorexia of the purging type, is more like it because she's obviously underweight if she hasn't had her period in a while</p> <hr/> <p>Sabine Salus</p>	<p>...</p> <p>Dear Dr. Cuddy, as you will be my temporary replacement I may introduce some of my current patients to you.</p> <p>Jessica Boyd is a 15 years old student, who applied to my office last week accompanied by</p>	
	<p>11:17 AM yes, as she is not eating much</p> <hr/> <p>Anne Mauer 11:17 AM yes i think so as well now :D</p> <hr/>	<p>her father. She presented with dizziness and pain in her right knee. Further she mentioned passing out twice within the last two to three months. When losing consciousness, she noticed cardial arrhythmia as well as a feeling of panic. Jessica watches her calories and leaves out breakfast. only sometimes desert(<- is that so?) . She throws up sometimes after meals and lost weight. Jessica had no menstrual period for 3 months, few times sex, used condoms sometimes but no further birth control These symptoms make me suspect anorexia nervosa-bulimia</p>	

Group 5: Chat-Text-Comments (19.7.2014)
Anne Gras - Anne Mauer - Sabine Salus

Figure 30: Chat-text overlap in group 5 (minute 29).

In this example, all three group members are engaged in the chat at 11:17 with Anne Gras arguing for anorexia nervosa as a potential diagnosis and the other two participants agreeing. At the same time, Anne Gras (colour code: green) makes a change in the text (“cardial arrhythmia...”) which is not related to the discussion of ‘bulimia vs. anorexia’. At the same time, Sabine Salus (colour code: pink) puts the result of the discussion (diagnosis: anorexia nervosa) into action by replacing “bulimia” with “anorexia nervosa” in the text. A number of observations can be made from that extract:

Time is relative: As was mentioned in chapters 3.3.1.1 Chat log and 3.3.1.2 Text revision history, *Google Docs* records changes and chat contributions only to the minute. Hence, it cannot be known exactly when certain changes were made to the text. Although the chat contributions are recorded in the right sequence of occurrence, it is not possible to know what

³³ Group five was chosen, as there was a comparably high amount of chat-text overlap in relation to the task completion time (58 percent, cf. Figure 29), so it was easier to locate instances of chat-text overlap.

students are referring to exactly. It is unclear, for example, whether Sabine Salus and Anne Mauer responded to Anne Gras' deliberations on a potential diagnosis right away or after tens of seconds and whether these utterances were made before, during, or after changes were made to the text by Anne Gras (colour code: green) and Sabine Salus (colour code: pink). This instance of disrupted adjacency³⁴ seems subtle but makes it difficult to determine whether participants are working on a joint issue or focussing on separate aspects at this exact point in time.

Also, chatting takes place within the full context of the text³⁵ and vice versa. As can be seen from the extract, Anne Gras argues for anorexia nervosa rather than bulimia as the proposed diagnosis. Both her peers agree (verbatim) which leads to Sabine Salus changing "bulimia" to "anorexia nervosa" in the text (at the bottom of the page). With the text and chat right next to each other and always in front of participants, the division into different channels (chat, texts, comments) does not seem to be relevant for the students. As can be seen from this extract, an overlap of chat and text activity is not necessarily an indicator of cooperation (people working on different aspects of the task separately). Neither is such an overlap an indicator of collaboration (people working on the exact same problem) – while all three members were discussing the "anorexia vs. bulimia" issue, Anne Gras worked on something entirely different at minute 29 as she added patient complaints into the text (colour code: green; "cardial arrhythmia as well as a feeling of panic."). Unfortunately, channel activity, and overlap of channel activity in particular, does not seem to be a reliable indicator of a specific mode of working together. Cooperation and collaboration as patterns of working together are seemingly not bound to a co-occurrence of participant activity in certain communication channels

³⁴ "[D]isrupted adjacency [...] is a common consequence of chat interaction, especially when multiple participants are involved, and several disjoint conversations can be interleaved, sometimes with overlapping participation from common participants" (Paolillo, John C. & Zelenkauskaite, Asta 2013: 120). Also see 2.4.1 Web 2.0 computer-mediated communication and wikis.

³⁵ Granted, the dataset is not a one-to-one representation of the collaborative experience. Yet, as can be seen in Figure 19 in chapter 3.3.2.3 Screen recording, chat and text are present next to each other the whole time.

A second approach to identifying collaboration-cooperation patterns was taken by investigating instances of synchronous text editing across groups, i.e. instances where more than one participant is making changes to the text at the same time. Studies investigating cooperation and collaboration in wikis, such as Arnold et al. 2012, focus primarily on the page history of the wikis and the changes made to that text. The willingness (or refusal) of the participants to touch other people's text is taken as an indicator of a rather cooperative or collaborative mode of working together. Consequently, instances of synchronous text editing, a phenomenon unique to shared documents technology, was of interest as students who worked on the text at the same time must be engaged in collaboration rather than cooperation. That is why instances of such synchronous text editing were recorded on a group level:

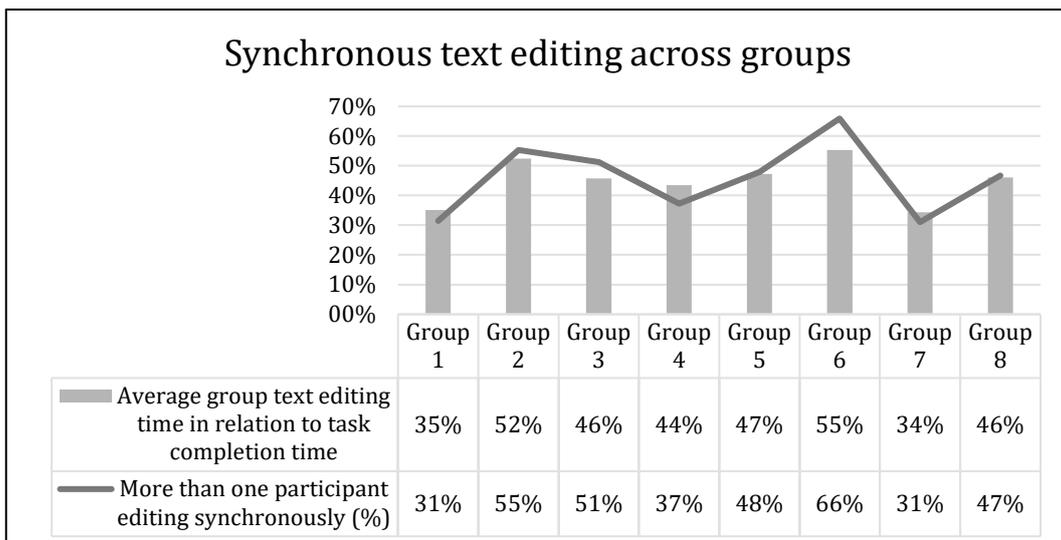


Figure 31: Synchronous text editing groups 1-8.

Figure 31 shows the average text editing time of all groups and the average time when there was more than one participant (i.e. two or all three participants) making changes to the text. As the two numbers correlate almost perfectly, it means that whenever there was activity in the text part of the *Google Docs* document, there were at least two people working on the text at the same time. Two or three people working on the same text seems a strong indicator for the collaborative pattern of working together. Again, looking into the dataset paints a different picture entirely.

Group 6: Chat-Text-Comments (19.7.2014) Henriette Gabel - Marina Mahwi - Sandra Sole			
11.03		<p>...</p> <p>Dear Dr. Cuddy,</p> <p>Further to our prior conversation, you will find in this email the patient information needed for further treatment of Je</p> <p>The presented symptoms and her oligomenorrhea suggest Bulimia nervosa. We will check her body mass index to rule out the potential of Anorexia nervosa.</p>	

Figure 32: Synchronous text editing in group 6 (minute 12).

Figure 32 displays synchronous text editing by two group members. Both participants keep a safe working distance from each other while focussing on different parts of the patient handover: Marina works on the introduction of the e-mail while Sandra puts together the diagnosis. Such an approach could be called cooperation, “[which] allows for some independent work of group members, who take responsibility for specific sub-tasks to be assembled into a larger whole at the end” (Arnold et al. 2012: 433). Indeed, group six creates the majority of their text body in such a way that participants work on their dedicated paragraphs without getting involved too much with other participants’ work. Even at a later stage of the activity, paragraphs can be attributed to the respective authors with relative ease. Consequently, instances of synchronous text editing are no indicator of the collaborative pattern but, in this case, of a cooperative pattern. But what about collaboration? When looking into the other datasets, it becomes clear that group 6 seems to be the exception here. In the other groups, text ownership very quickly becomes confusing³⁶.

³⁶ This has been pointed out earlier in chapter 3.4.3.3 (Selective inclusion of text revision activity).

11.22	Irmgard Apfel 11:22 AM thanks	<p>Dear Dr. Cuddy,</p> <p>thank you for taking care of my patients during my absence. I am presenting you with a 14 year old girl named Jessica. She came to me with her father because of some symptoms that previously occurred during physical exercise. She participates in her school's track and field's team and is being trained by her father.</p> <p>She's very ambitious and exercises on a daily basis, unconcerned about effects on her health. Her training attitude is fortified due to her father's high expectations and rewarded by appreciation of her success.</p> <p>When she presented in my office with her father they were complaining about her having fainted twice during exercise within the past two weeks. She said fainting always came along with a feeling of dizziness. When asked about her da</p> <p>For her treatment i would suggest a cognitive-cognitiv-behavioral-therapy, done as a family therapy and although in sessions with other affected patients. H#r</p>	
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Figure 33: Synchronous text editing in group 1 (minute 32).

Figure 33 also shows an instance of synchronous text editing (this time by three instead of two participants). However, the pattern looks completely different: Rather than keeping their distance from each other, participants actively co-construct the text on a sentence level. The participants are engaged in collaboration. Only two minutes later, the situation, again, looks entirely different:

11.24		<p>She also mentioned drinking a lot of diet coke. Jessica admitted having vomited once or twice after eating. She is not aware of this being a problem for her health.</p> <p>For her treatment I would suggest a cognitive-behavioral-therapy, done as a family therapy and although in sessions with other affected patients. Her father has to- Her weight must be under close monitoring. Also her nutrition should must be reconverted and her exercises must be decreased.</p>	
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Figure 34: Synchronous text editing in group 1 (minute 34).

These two instances of synchronous text editing display clearly why it is problematic to apply the collaboration-cooperation dichotomy to synchronous collaborative writing: Text ownership as an indicator of collaboration or cooperation becomes useless very quickly in synchronous collaborative writing as participants, unlike in wikis, do not have to wait until their peers have finished editing. Everybody can change anything at any time. While this leads to a truly equal distribution of communication tools and hence may foster equal participation, it makes it nearly impossible to allocate

certain pieces of writing to certain participants. It becomes very difficult to draw a line: A sentence, which could be traced back to one participant at one point in time, might have been manipulated by several people at the same time only seconds or minutes later. Also, the term ‘revision’ as the act of making changes to a piece of writing which already exists becomes problematic in synchronous collaborative writing: With collaborative practices as shown in Figure 33: Synchronous text editing in group 1 (minute 32), it is very unclear whether the text is being ‘created’ collectively or ‘revised’ collectively³⁷.

4.2.3 Communication channel usage: summary of findings

Research question one aimed at describing the communication channel usage of small groups of L2 students in *Google Docs* when faced with a complex collaborative writing task: “How much time do small groups of L2 students spend in the three communication channels of Google Docs in a synchronous group writing activity?” Channel usage was primarily defined as time spent in the respective communication facilities of *Google Docs*, i.e. chat, text, or comments.

The first investigation of channel usage on a more global level revealed that channel preferences varied greatly among the eight groups. Groups spent on average approximately 74% of their respective task time on making changes to the text. There was some variation in the range (group 7: 53.4 percent vs. group 3: 87.1 percent). Yet, differences were much more dramatic in chat use: On average, groups spent 51 percent of their task time on chatting with values ranging from 23.3 percent (group 8) to 81.2 percent (group 5). Interestingly, groups who dedicated a lot of resources to chatting (mainly groups 1 and 5) dedicated equally substantial amounts of time to making text edits. Increased chatting activity did not compromise the willingness to make text edits (at least from a quantitative point of view). However, these groups had the worst performance in the final texts. In contrast, groups who dedicated considerably less time to chatting scored best

³⁷ Granted, this issue also exists in individual writing to a certain extent. Phases of adding text and editing text alternate. However, the fact that three people are making changes to a text at the same time blurs these lines even more.

in the final texts (mainly groups 6 and 8). The analysis of discussion episodes in the following chapter will provide insights into whether the contents of these chat interactions can provide an explanation for this connection between chat quantity and task performance. The comments feature was barely used, which is not all that surprising as this feature is, by design, geared towards asynchronous activities. Only one group (group 4) really used the feature which will be considered within the analysis of discussion episodes.

The second more specialised investigation focussed on the distinctive feature of *Google Docs* (and shared documents technology in general): the possibility of synchronous cross-channel activity. By looking at instances of synchronous activity (or the lack thereof) on a global channel usage level it was hoped that different patterns of working together, namely cooperation or collaboration, could be identified. The literature suggests that “[...] collaboration has greater potential to improve the end product’s quality, whereas the division of labor in cooperation might provide for speedier, more convenient task completion. (Arnold et al. 2012: 433)“. However, neither the analysis of chat-text overlap nor the analysis of instances of synchronous text editing could provide such insights. During 33% of the task time, there was an overlap of chat activity and activity in the text. The intuitive assumption that participants focus on different aspects of the task when they operate in different communication channels (and hence engage in cooperation), was proven wrong by the collaborative data sets. The ubiquity of text and chat right next to each other make it very easy for participants to work on the exact same aspect of the task with, for example, two people discussing a language matter in the chat and the third participant carrying out the changes at the same time. The investigation of instances of synchronous text editing promised to be a better metric on paper but proved to be just as problematic. The sheer fact that two or more people were working on the text at the same time was not a reliable indicator of how people approached the text. Participants kept either a safe working distance with every participant staying within their own paragraph (cooperation), or worked together very closely on a sentence level, with, for example, two

participants making changes to a sentence while another participant was still writing the sentence (collaboration). Also, both practices could take place in the same group within two minutes, which makes it even less feasible to draw a clear line between collaboration and cooperation.

For the aforementioned reasons, it appears that the dichotomy collaboration-cooperation is not a feasible dimension in describing learners' preferred mode of working together in a synchronous collaborative writing activity. The concept of text ownership is essentially useless: "In collaborative groups learners engaged in co-constructing the [text] by reading, evaluating, and refining ideas posted by their peers. In such texts, it was no longer possible to separate the contributions of individual members, as the members became the joint owners of the entire text" (Storch 2013: 150). Presumably, this is due to the synchronous nature of the activity and the ubiquity and accessibility of communication tools within *Google Docs*. In addition, synchronous activities imply a limited time frame (here: 45 minutes) – students simply have to engage with each other actively to solve a complex task in a relatively short amount of time. In line with Scanlon's definition of collaboration, I argue that participants in synchronous collaborative writing, by default, engage in collaboration rather than cooperation: "[...] [C]ollaboration can mean a coordinated attempt to solve and monitor a problem together, with perhaps some division of labour on aspects of the problem". (Scanlon 2000: 464–465). From a second language acquisition perspective, the participation levels of this synchronous collaborative writing activity investigated in this study are promising. Given an average task fulfilment time of 51.1 minutes, 41.7 minutes on average per student (approximately 82 percent) were spent either chatting or contributing text to the document (cf. Table 7: Communication channel activity in minutes.). Such a high level of engagement creates many opportunities for language development to take place as students interact with each other in the target language to negotiate, reflect on, and produce language material – all prerequisites for L2 development both from an output hypothesis and interaction hypothesis point of view.

4.3 Discussion episodes

Having analysed the channel usage preferences of small groups of L2 learners in a synchronous collaborative writing activity in order to gain a general impression of the interactive practices, the attention now turns to what is actually being negotiated in the course of the activity. Although there are possibly hundreds of instances of changes made to the co-authored texts without explicit negotiation among the participants, it cannot be assumed that every single change was noticed by every team member and hence internalised (following Schmidt's noticing hypothesis). Surely, the "[...] activity of producing the target language may prompt second language learners to recognize consciously some of their linguistic problems [...] [and, consequently,] trigger cognitive processes that might generate linguistic knowledge that is new for the learner or consolidate the learner's existing knowledge" (Swain 1998: 67). However, such implicit noticing cannot be monitored in our data using the chosen data collection and analysis method. "In order to determine whether [...] collaborative writing is conducive for L2 learning, we need empirical evidence [...] of learners deliberating and reflecting about language use, providing positive as well as corrective feedback, and pooling their linguistic resources to resolve uncertainties about language use, be it vocabulary, grammar or mechanics". (Storch 2013: 144–145). That is why research question two centres on the contents of learners' discussions in the course of the collaborative activity. When such discussions revolve around language, we speak of 'linguaging' (cf. 2.1.2 Socio-cognitive SLA theories: Social learning); "[in] it, we can observe learners operating on linguistic data and coming to an understanding of previously less well understood material. In linguaging, we see learning taking place" (Swain 2006: 98).

Consequently, this chapter focuses on the findings from the classification and analysis of discussion episodes. As was outlined in chapter 3.4.3 Discussion episodes, participant turns have been tagged according to a taxonomy of discussion episodes, informed both by existing studies in the field (theory-driven) and by the data of the current study (data-driven). On a

basic level, the taxonomy differentiates between three types of focus areas: language, content, and social. The “language” type consists of “form-oriented language-related episodes” (FO-LREs), “meaning-oriented language-related episodes” (MO-LREs), and “layout” (L). The “content” type subsumes the focus areas “content” (C) and “content structure and coherence” (CS). Lastly, the “social” type consists of “workflow management” (WM) and “small talk” (ST). The taxonomy also covers so-called “meta-level tags”, i.e. additional information on language and technology use which is mapped on top of the actual focus-area tags in the documents. Meta-level tags are divided into two types, each containing two categories: “language-related meta-level tags” (“German / L1 usage” and “emoticons, emojis and language play”) and “channel-related meta-level tags” (“text section” and “comments section”):

Discussion episodes: Focus areas			
Type	Focus area	Code	Description: Utterances about/containing...
Language	Form-oriented language-related episodes	FO-LRE	Grammatical accuracy on a surface level: form and tense of the verb, form of adjectives, adverbs, articles, linking devices, nouns, prepositions; punctuation, spelling, syntax, word order.
	Meaning-oriented language-related episodes	MO-LRE	Word choice, translations, words’ meaning, style, register, alternative ways of expressing an idea, lexico-grammar.
	Layout	L	Visual layout and formatting the text: Bold, italics, underlined, headings, lists.
Content	Content	C	Patient history, patient diagnosis, treatment plan, re-reading and re-watching

			activities.
	Content structure and coherence	CS	The logical structure of the e-mail: where to put what in the text, sequence of ideas/content.
Social	Workflow management	WM	Task management, delegations of (sub-) tasks (who does what), negotiating and implementing a work plan.
	Small talk	ST	Greetings, general appraisal and critique, gratitude, humour, unspecific remarks.
Discussion episodes: Meta-level tags			
Type	Tag	Code	Description
Language	German / L1 usage	G	Words, phrases, clauses, sentences in German.
	Emoticons, emojis and humour	E	Usage of emoticons, emojis, and humorous expressions.
Channel usage	Text section	T	Discussions which take place in the text section of the document.
	Comments section	COM	Discussions which take place in the comments section of the document

Table 8: Taxonomy of discussion episodes of the current study.

The analysis of discussion episodes will provide insights into what students deemed worthy of talking about during a synchronous collaborative

writing activity in a computer-mediated multi-modal environment under time constraints. These findings of actual usage will be discussed based on the theoretical qualities of the medium, the task-based nature of the activity, and language learning opportunities. It will also offer possible explanations for some of the observations regarding communication channel usage (cf. 4.2 Communication channel usage).

4.3.1 Global observations: Prevalent focus areas

In the following, the global observations of the data analysis are presented, interpreted, and discussed. Discussion contributions were tagged individually for each of the eight groups in alignment with the task time. They were then counted for each group which resulted in the following table:

G 1-8	FO-LRE	MO-LRE	ST	C	CS	WM	L	G	E	T	COM	Total w/o meta	Total w/ meta
G1	9	29	6	48	24	43	0	4	10	0	0	159	173
G2	2	11	6	6	4	5	0	1	3	6	2	34	46
G3	0	8	7	9	5	2	0	8	7	3	0	31	49
G4	2	26	14	19	24	19	6	2	7	4	23	110	146
G5	0	8	11	32	15	44	0	4	25	11	0	110	150
G6	0	0	3	16	7	21	0	1	8	0	0	47	56
G7	0	4	3	4	8	43	0	2	7	3	0	62	74
G8	0	11	7	13	5	7	0	28	3	8	0	43	82
Total	13	97	57	147	92	184	6	50	70	35	25	596	776
Mean	1.6	12.1	7.1	18.4	11.5	23.0	0.8	6.3	8.8	4.4	3.1	74.5	97.0
Median	0	9.5	6.5	14.5	7.5	20	0	3	7	3.5	0	54.5	78

Table 9: Discussion episodes groups 1-8: focus areas and meta-level tags³⁸.

These numbers have been visualised in the following diagram:

³⁸ FO-LRE: form-oriented language-related episodes; MO-LRE: meaning-oriented language-related episodes; ST: small talk; C: content; CS: content structure and coherence; WM: workflow management; L: layout; G: use of L1; E: emoticons and emojis; T: discussions in the text; COM: discussions in the comments.

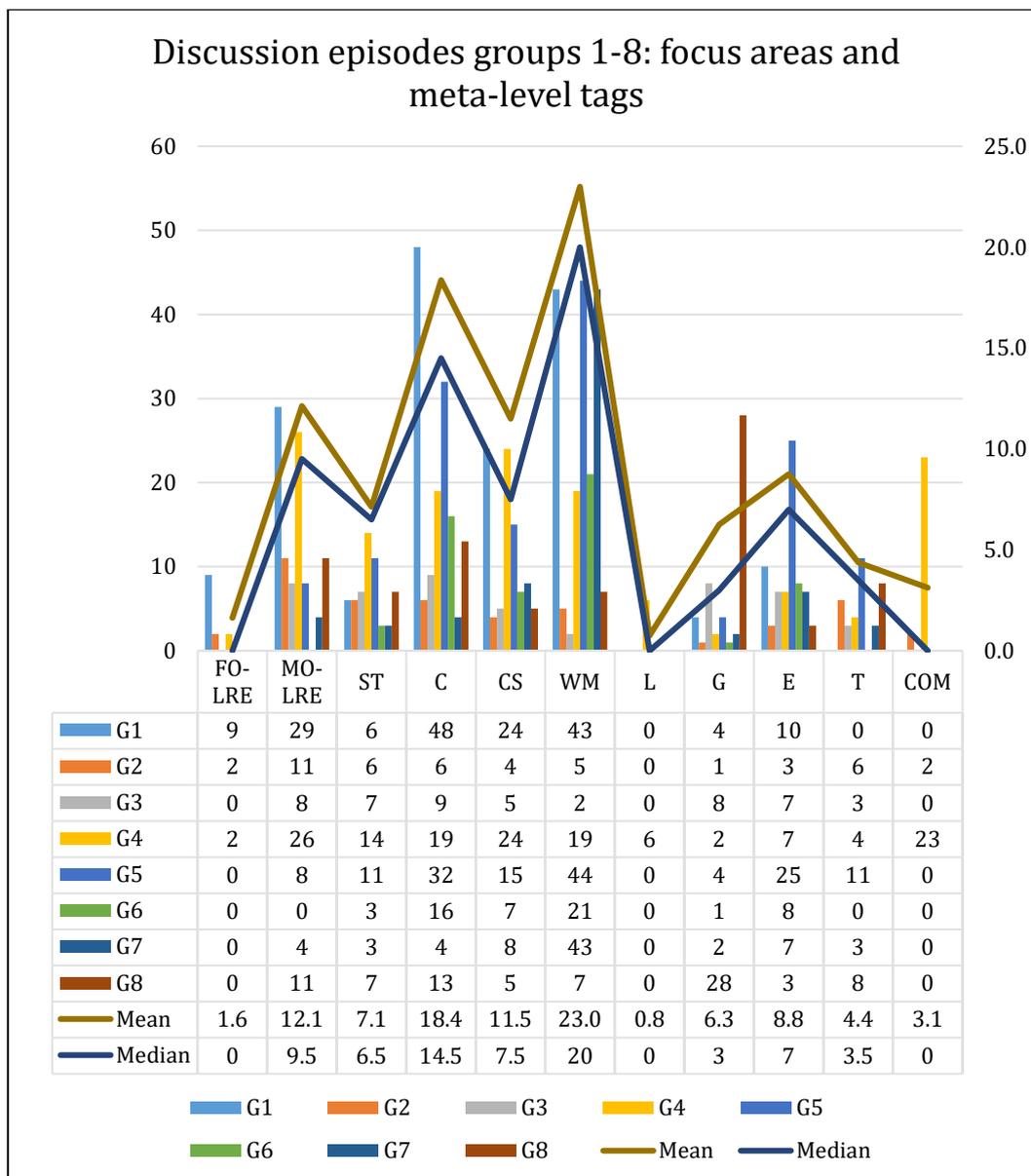


Figure 35: Discussion episodes groups 1-8 focus areas and meta-level tags diagram³⁹.

Looking at the totals of “focus areas” first (and neglecting the meta-level tags “G”, “E”, “T”, “COM” for a moment), it quickly becomes apparent that there are five out of eight categories of “focus areas” which are prevalent in the data: “workflow management / WM” (184 tags), “Content / C” (147 tags), “meaning-oriented language related episodes / MO-LRE” (97 tags), “content structure and coherence / CS” (91 tags), and “small talk / ST” (55 tags). The

³⁹ FO-LRE: form-oriented language-related episodes; MO-LRE: meaning-oriented language-related episodes; ST: small talk; C: content; CS: content structure and coherence; WM: workflow management; L: layout; G: use of L1; E: emoticons and emojis; T: discussions in the text; COM: discussions in the comments.

categories “form-oriented language-related episodes / FO-LRE” (13 tags) and “Layout / L” (6 tags) are basically negligible.

The total number of focus areas tags differs greatly from group to group. Groups one, four, and five were attributed 110 tags or more whereas the remaining groups were attributed approximately 55 tags or less (median: 54.5). Since only 35 out of 596 tagged discussion episodes took place in the text (and 25 in the comments), chat can be considered the prime location for discussion. Although focus area tags do not reflect the number of chat turns (a chat utterance can contain more than one tag; cf. chapter 3.4.2.2 Taxonomy of discussion episodes.), they nevertheless reflect a group’s general level of participation. In fact, groups who chat a lot create many discussion episodes:

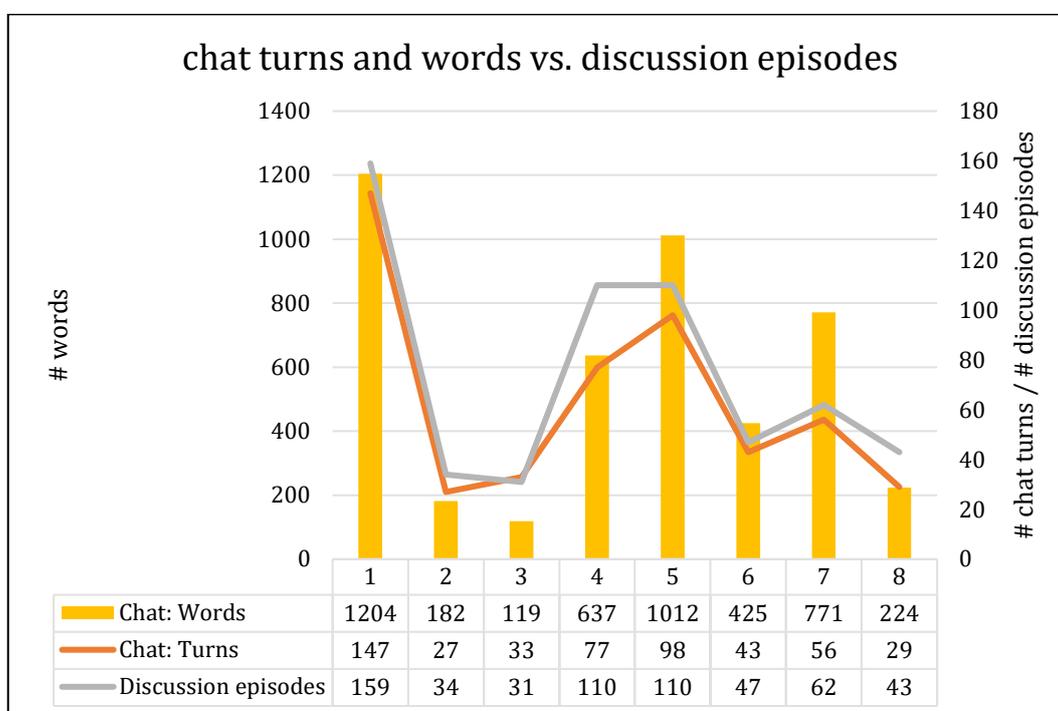


Figure 36: Chat turns and words vs. discussion episodes.

As a result, groups one, four, five, and seven can be considered ‘more active’ in discussions whereas groups two, three, six, and eight can be considered ‘less active’. In general, this is in line with the findings of the global communication channel analysis based on time spent in the chat (cf. 4.2.1 Global communication channel usage: time spent on editing vs. interaction).

4.3.2 Low-frequency categories

Before interpreting the most frequent categories, it should be noted that the least frequent categories, namely “form-oriented language-related

episodes / FO-LRE” and “Layout / L”. “Form-oriented language-related episodes” refer to contributions regarding grammatical accuracy on a surface level, i.e. form and tense of the verb, form of the noun, adjectives, adverbs, articles, prepositions, linking devices, syntax, and word order (cf. Table 8).

From an objective point of view, grammatical accuracy on a surface level can be understood as a matter of requiring little debate. Words and phrases are either grammatically right or wrong; however, the concepts ‘grammatically right’ and ‘grammatically wrong’ can be very different depending on the language user who has to make this distinction, particularly in a heterogeneous language proficiency environment where speakers of different language proficiency levels might have vastly different perceptions of right and wrong. “[...] [Learners] engaging in conversation will create an ideal situation for L2 learning when some misunderstanding arises and the speaker and the interlocutor negotiate for meaning” (Yanguas 2010: 74). In a total of approximately 409 minutes of synchronous collaborative writing in eight groups, there is almost no evidence of form-oriented, language-related episodes. In fact, only groups one (8 tags) two (2 tags), and four (2 tags) bothered with form-oriented LREs at all. Those eight tags of FO-LREs in group one translate into three actual form-oriented issues: the possible plural of the word ‘success’, the preposition that goes with the word ‘appreciation’ (two turns in total, both at 11:18 / minute 28), and the preposition that goes with the word ‘expectation’ (a total of five turns at 11:44 / minute 54). The two tags of FO-LREs in group two refer to one syntactic problem brought up at 11:30 (minute 41): “Her father [...] also mentioned her (?) stopped breathing”. The issue is solved directly in the text only one minute later by another participant (“Her father [...] also mentioned she stopped breathing”). The two tags in group four revolved around capitalisation at minute 51 (“is it capital letters after these bullets? – “think so”). Therefore, only five actual form-oriented language-related episodes (in ten turns) were recorded, one about number, two about the use of prepositions and one about a complex syntactic problem.

The possible explanations for this are manifold: The first and most obvious explanation would be the students’ language proficiency level: 21 out

of 24 students scored a CEFR level of C1 or higher, so surface level grammar should not pose a serious challenge to these students. Secondly, given that the language level is rather homogenous in the group, grammar issues should not be a matter of great debate for these students as their perception of right or wrong should generally be on a similar level. Even if grammatical problems arise in the collaborative process, they are more likely to be solved in the text directly without discussion. Thirdly, the task setting requires time efficiency as all discussion has to take place in a written form. Simple grammar matters which are of little controversy (according to the students' judgement) might just not be worth delegating time and energy to.

Finally, the non-language related focus area of "layout" has only been tagged six times in the data, all of it in group four. The first layout episode at 11:34 (minute 52) takes three turns (until 11:35, minute 53) to discuss the formatting of the whole message (bold). The second layout episode at 11:36 (minute 54) also takes three turns and covers the formatting of the e-mail signature ("why is dr. merinstein blue?"). Again, time constraints, the ability to make quick changes directly in the text, and the rather uncontroversial nature of the issue of layout seem plausible explanations for the absence of this type of focus area in the discussion episodes. Also, the students were asked to create an e-mail with some basic formatting already provided. Although the text type 'e-mail' is surely not as standardised as other forms of composition, it probably does not stimulate avid discussion about layout (again given the time constraints and the task description).

In conclusion, the absence or rather the low frequency of the categories "form-oriented language-related episodes / FO-LRE" and "Layout / L can, in part, be explained by the task design (text type: e-mail, limited time frame, limited number of words, computer-mediated communication only; cf. chapter 3.2.3 Task design.) and task context (participants: average language level of C1 according to the CEFR; cf. chapter 3.2.2 Participants.). Questions of layout are almost negated by the task instructions as the text type (e-mail) was a given and so was the basic layout of the e-mail (sender, recipient, topic, text). The absence or low frequency of the category "form-oriented language-related episodes / FO-LRE" can also partially be explained

by the task design: Time was limited and typing takes time. Matters like spelling and punctuation can be seen as rather uncontroversial, particularly so when taking the participants' high level and homogeneity of language proficiency into account. Overall, students seemed to prefer making surface-level changes, which all three low-frequency discussion categories can be seen as, directly in the text rather than discussing them first. Also all discussion episodes from these three categories took place in the middle (around the 30-minute mark) or towards the end (50+ minutes) of the activity, which underlines their surface-level character as they fall into the revision phase of the writing process (cf. Flower and Hayes 1981: 370; Zimmermann 2000: 85).

4.3.3 High-frequency categories

Four focus area categories stand out in the data as they occur most frequently: “workflow management / WM” (184 tags), “content / C” (147 tags), “meaning-oriented language related episodes / MO-LRE” (97 tags), and “content structure and coherence / CS” (91 tags). In the following, each of these categories is explored further and illustrated by the data.

4.3.3.1 Workflow management

“Workflow management” refers to discussions about “task management, delegation of (sub-) tasks (who does what), and negotiation and implementation a work plan” (cf. Table 8). With a mean of 23 tags per group (median: 20) and a total of 184 tags across all groups (of 596 focus area tags in total), “workflow management” turned out to be the most popular focus area in student discussions (cf. Table 9: Discussion episodes groups 1-8: focus areas and meta-level tags.). In line with the global participative patterns in the discussions (cf. Figure 35), groups one, five, and seven covered the category “workflow management” quite extensively in their chat discussions with 34, 44, and 43 tags respectively. The prevalence of this category does not come as a surprise: Students in groups of three (who have never worked together in this configuration before) were asked to collaboratively create a medically themed text in a foreign language using only synchronous computer-mediated tools (which most of them had never used before) to communicate. Discussions regarding very pragmatic issues

(e.g. how to avoid confusion with three people writing at the same time) and interactions regarding task delegation (who does what) were bound to take place.

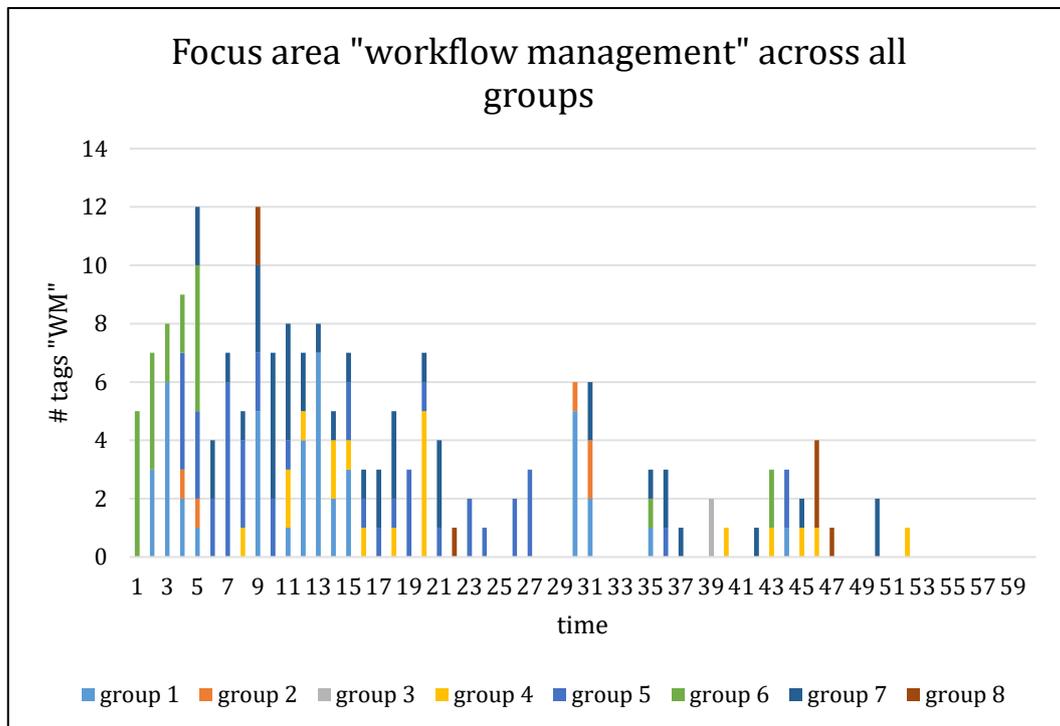


Figure 37: Focus area "workflow management" across all groups.

As can be seen in Figure 37, workflow-related discussions peak in the first third of the timed portion of the activity and decrease over the course of the activity, indicating that the negotiation of a work plan and the delegation of tasks takes place in the beginning and is only modified slightly over the course of the activity with little to no discussion. In the first 20 minutes, groups one, four, five, six, and seven dedicate a fair amount of resources to managing their workflow with 34, 14, 32, 18, and 30 "WM" tags respectively. A typical example of a series of workflow-related chat turns:

Group	Time	Chat
Group 1	2	<p>Renate Hiss (10:52 AM) so how are we going to do this?? should we just separate the email into parts??</p> <p>Tanja Portlänger (10:52 AM) Guess we could do that</p> <p>Irmgard Apfel (10:52 AM)</p>

		we could if we agree on a diagnosis
	3	<p>Renate Hiss (10:53 AM) yeah, i think obne could do the general introduction then symptoms and diagnosis?</p> <p>Tanja Portlänger (10:53 AM) yes let's just discuss her symptoms and her diagnosis here in the caht</p>

Table 10: Workflow management in group 1.

Every single chat turn here was tagged with “workflow management”, resulting in five “workflow management” tags⁴⁰.

However, it is surprising that groups two, three, and eight managed to master the task with basically no workflow-related discussions at all in the first 20 minutes (with two, zero, and two “WM” tags respectively) as well as over the course of the entire activity. A look into the data of these three groups reveals that the first suggestion for a possible work plan or collaborative approach was accepted and not discussed further:

Group	Time	Chat
Group 2	4	<p>Norbert Korezko (10:53 AM) how about we sum up her symtpoms on the bottom and after that, writing the e-mail?</p>
	5	<p>Jule Botzel (10:54 AM) sounds good!</p>

Table 11: Workflow management in group 2.

Norbert suggests summing up the patient symptoms and using this as the basis for developing the e-mail. His peer, Jule, agrees and this constitutes the whole workflow management process of this group as the activity begins. The third group member, Susanne, just follows along and adds to the collection of symptoms. In group three, there is no workflow management discussion whatsoever:

⁴⁰ In line with what one expects from chat interaction, minor inaccuracies like spelling or capitalisation mistakes occur without the students feeling the urge to correct them. This tolerance of language inaccuracies, which can be deducted by the context, is also in line with the general phenomenon of reduction in computer- mediated communication (cf. Paolillo, John C. & Zelenkauskaite, Asta 2013: 123).

10.53	<p>Felicitas Kester 10:53 AM what was her initial complaintß</p> <p>-----</p> <p>Louisa Rufenbach 10:53 AM passing out</p> <p>-----</p>	<p>Start writing after the horizontal line:</p> <hr/> <p>From: Dr Merinstein To: Dr Lisa Cuddy Subject: Jessica Boyd --</p> <p>Dear Dr. Cuddy,</p> <p>as my subbing doctor you will meet Jessica Boyd, she presented last week with knee pain (</p>
<p>Group 3: Chat-Text-Comments (19.7.2014) Matthias Ronberg - Felicitas Kester - Louisa Rufenbach</p>		

Table 12: No workflow management in group 3.

With no tangible work plan whatsoever, group three just dives into discussing content-related questions and starts co-authoring the e-mail. This behaviour is in line with the group's general communicative behaviour as there were only 31 discussion episodes recorded for this group.

4.3.3.2 Content

Content-related discussions revolve around "patient history, patient diagnosis, treatment plan, re-reading and re-watching activities" (cf. Table 8: Taxonomy of discussion episodes of the current study.). With a mean of 18.4 tags per group (and a median of 14.5) and a total of 147 tags across all groups, "content" is the second most frequent category of discussion episodes (cf. Table 9: Discussion episodes groups 1-8: focus areas and meta-level tags.). Again, in line with the global participative patterns (cf. Figure 36), groups one and five covered content the most in their discussions with 48 and 32 tags respectively.

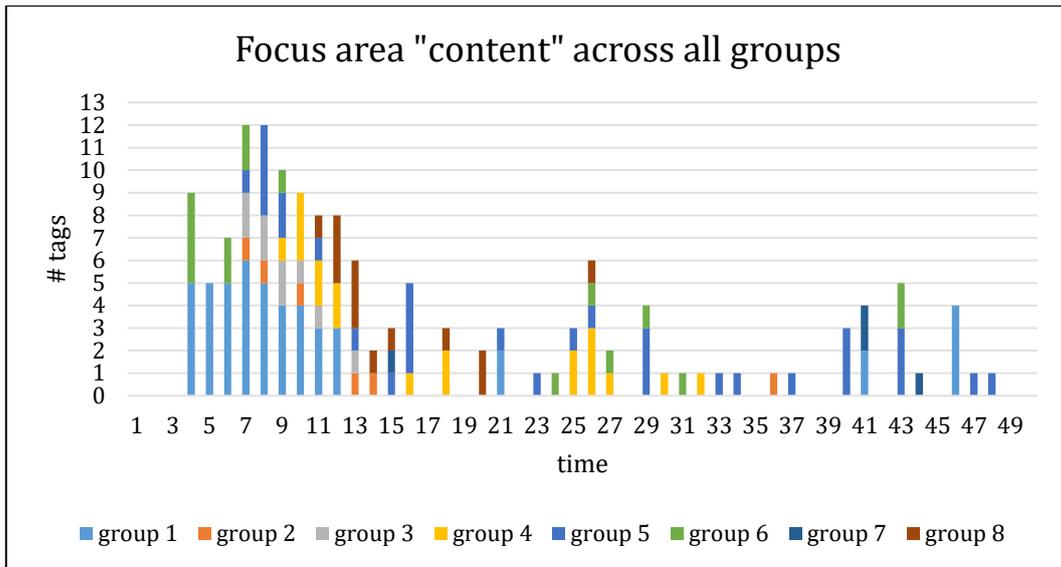


Figure 38: Focus area "content" across all groups.

The overall high number of content-related discussions can partly be explained by the task design: Students were asked to introduce a patient they received information on during the preceding workshop day and who had a comprehensive list of complaints and symptoms to be described. Also, additional factual information on the symptoms was to be learnt in the preceding online phase. As a consequence, students needed to establish a common understanding of the patient's complaints and symptoms in order to justify a joint diagnosis and treatment plan.

As can be seen in Figure 38, the majority of content-related deliberations took place in the first 20 minutes of the activity. With a total of 101 "content" tags in the first 20 minutes, two thirds of all content-related discussions took place in the first third of the activity. From a task design perspective, this makes sense as a common content basis has to be established first before this information can be incorporated in the email. Here is an example of a typical content-related chat episode:

Group	Time	Chat
Group 6	6	<p>Marina Mahwi (10:57 AM) it might be anorexia</p> <p>Sandra Sole (10:57 AM) we have to consider her weight in order to judge her bmi actually</p>

		if she's underweight then we might consider anorexia
	7	<p>Henriette Gabel (10:58 AM)</p> <p>she lookedlike she had normal weight, right? i think bulimia with not only purging but excessive exercise?</p> <p>Sandra Sole (10:58 AM)</p> <p>And if she continues not having a period for a continuous 3 months then anorexia might be present</p>

Table 13: Content-related discussion in group 6.

The example illustrates quite well how students argue for and against a certain diagnosis. Even though they are not reflecting on language explicitly (in the sense of languaging which creates focus on form and hence might trigger the understanding and internalisation of language phenomena), students create comprehensible input for each other by engaging in the production of utterances. The shortness of their rather focussed utterances speaks to both the hybrid oral-written nature of chat (ibid.: 109) and the time constraints of the task design (lack of face-to-face interaction and typing as the primary means of interaction).

4.3.3.3 Meaning-oriented language-related episodes

“Meaning-oriented language-related episodes” (or “MO-LREs”) involve “word choice, translations, words’ meaning, style, register, alternative ways of expressing an idea and lexico-grammar” (cf. Table 8: Taxonomy of discussion episodes of the current study.). With a mean of 12.1 tags per group (and a median of 9.5) and a total of 97 tags across all groups, “meaning-oriented language-related episodes” is the third most common category of discussion episodes (cf. Table 9: Discussion episodes groups 1-8: focus areas and meta-level tags.). Meaning-oriented language-related episodes are of particular interest from a second language acquisition point of view (cf. Storch 2013: 144–145). Such deliberations and reflections about language use are commonly referred to as language-related episodes, i.e. “[...] any part of a dialogue where the students talk about the language they are producing, question their language use, or correct themselves or others” (Swain and Lapkin 1998: 326). In other words, evidence of meta-discussion about language can be seen as evidence of possible opportunities for language

acquisition⁴¹. The distribution of meaning-oriented language-related episodes across groups in the course of the activity looks different than the distribution of workflow- or content-related discussions:

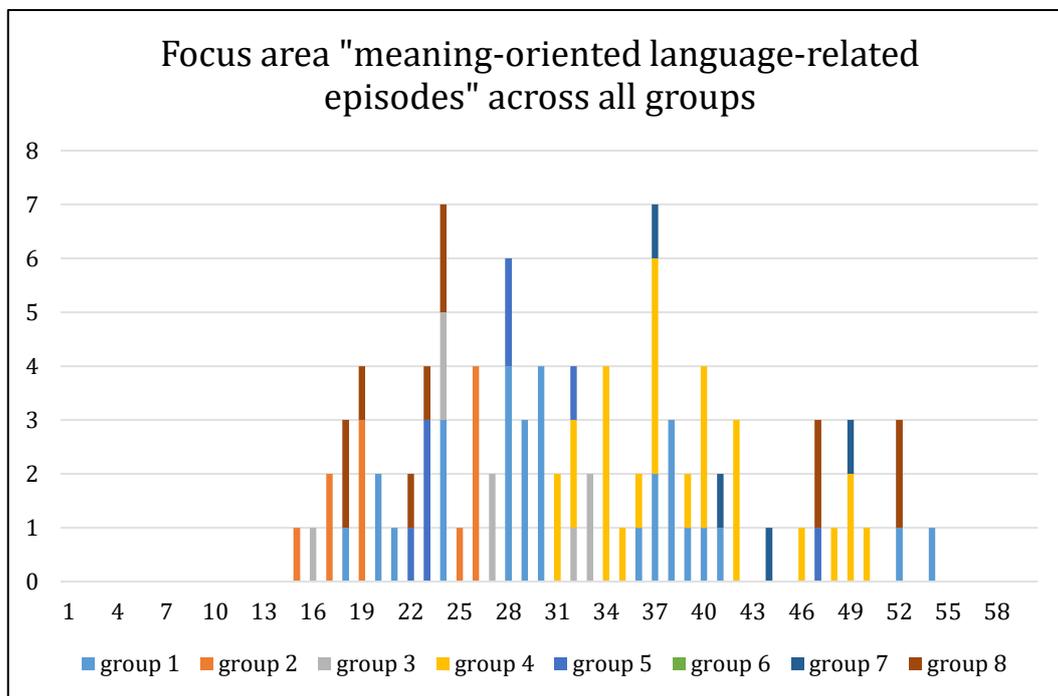


Figure 39: Focus area "meaning-oriented language-related episodes across all groups.

As can be seen in Figure 39, meaning-oriented language-related episodes do not occur before minute 15 and flatten out after the 40-minute mark. In other words, language-related discussions take place at the heart of the collaborative writing activity. This is not surprising; participants have to establish a common content basis and decide on a work plan before deliberating about how to put these considerations into practice, which means engaging in productive language use.

As meaning-oriented language-related episodes are of key interest in terms of language learning, they have been analysed in a more detailed fashion. As was mentioned earlier (cf. 3.4.3.2 Taxonomy of discussion episodes for this study), tags regarding the content of discussions were allocated to single chat turns primarily. A single chat turn, strictly speaking, does not constitute a whole 'episode' as several chat turns can revolve

⁴¹ Language-related metatalk can only be considered an opportunity or a trigger for second language acquisition. In order to find out whether certain metatalk actually leads to second language acquisition, a longitudinal study, which investigates students' communicative behaviour in subsequent situations, would be needed.

around the same phenomenon. That is why MO-LREs were analysed in a more detailed way, summarising several turns into episodes based on the phenomena which were being negotiated by the students. An overview of all MO-LREs sorted by groups, start time, number of turns involved, and content can be found in the appendix (cf. 7.7 Meaning-oriented language-related episodes). This analysis resulted in the following overview:

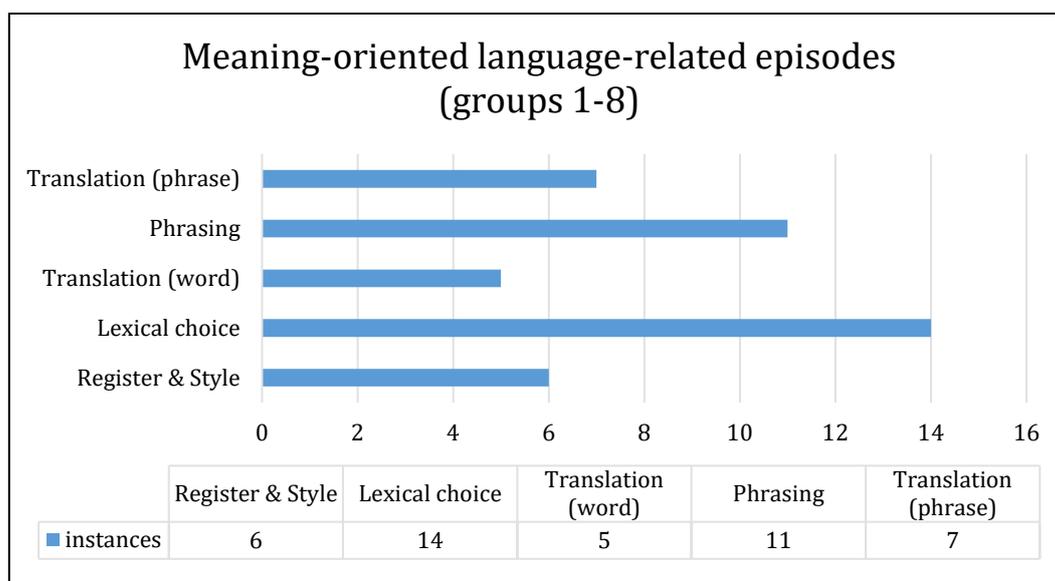


Figure 40: Focus areas of meaning-oriented language-related episodes.

As can be seen from the figures, most meaning-oriented language-related episodes concerned lexical choice. An example:

Group	Time	Chat
5	28	<p>Anne Gras (11:16 AM) if I talk about her heartbeat, should I just call it arrhythmia?</p> <p>Anne Mauer (11:16 AM) yes!</p>

Table 14: MO-LRE on lexical choice (group 5).

This piece of chat interaction was counted as one MO-LRE on lexical choice, consisting of two turns. The second most common category within MO-LREs was phrasing, i.e. instances when students did not know how to say something in English⁴². The following series of chat turns was counted as one MO-LRE on phrasing:

⁴² "Phrasing" refers to episodes about more than one word.

Group	Time	Chat
2	19	<p>Jule Botzel (11:08 AM)</p> <p>I'm trying to think about how we could rephrase the second part maybe. any ideas? is that ok?</p> <p>Susanne Rach (11:08 AM)</p> <p>I would rather say presented with passing..</p> <p>Norbert Korezko (11:08 AM)</p> <p>fine for me :)</p>

Table 15: MO-LRE on phrasing (group 2).

The categories ‘translation (word)’ and ‘translation (phrase)’ indicate discussion episodes where one student provided a German word or phrase which he or she wanted to have translated into English (“How do I say this in English?”)⁴³. Episodes regarding “register/style” often occurred as general remarks on a sentence level (“This should sound more formal”), sometimes providing specifics on how to achieve a certain level of formality. It is worth noting that, with few exceptions, the episode-turn ratio was relatively low:

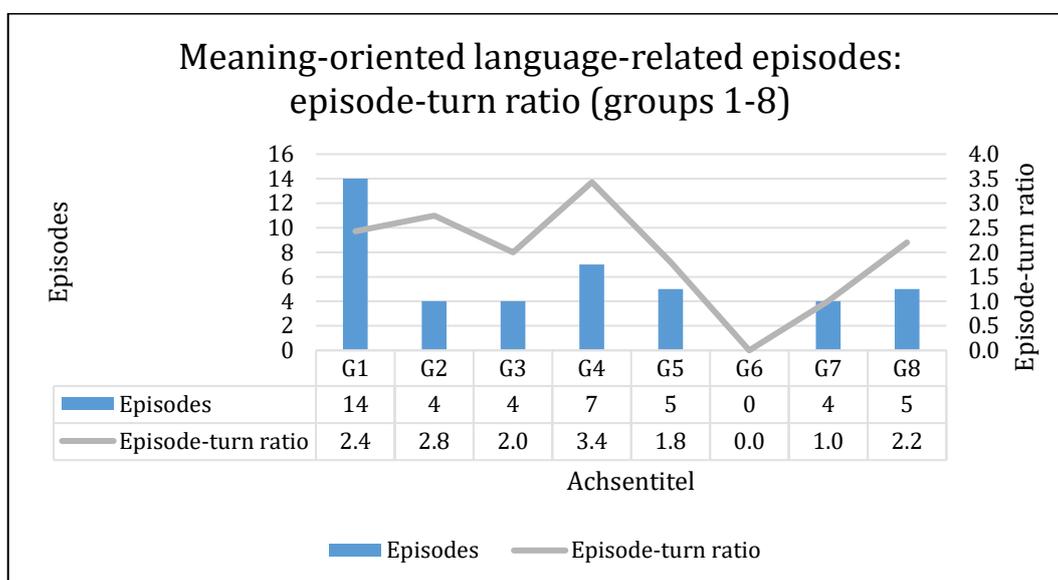


Figure 41: Meaning-oriented language-related episodes: episode-turn ratio⁴⁴.

In line with the example provided in this chapter, discussion episodes consisted of relatively few turns. As can be seen from the overview in the

⁴³ Unlike the categories “phrasing” or “lexical choice” where students used English to describe their linguistic problem, the two “translation” categories refer to instances where students gave German expressions to be translated into English.

⁴⁴ “G” stands for group.

appendix, there were many instances of MO-LREs (21 of 43) which consisted of only one turn. This means that such a one-turn episode was either a mere comment (which did not provoke change or discussion) or was solved in the text directly. Probably, this can be attributed to two factors: First, students worked under time constraints with typing the only (and, arguably, slower) means of interaction (compared to face-to-face interaction). Second, within the full context of the text, it is simply not necessary to verbalise every single thought or action. The following example from group three shows the challenge of drawing a line between a text edit and a discussion episode:

Group 1: Chat-Text-Comments (19.7.2014) Imgard Apfel - Renate Hiss - Tanja Portlanger		
		Jessica. She came to me with her dad because of #m
11.08	Tanja Portlanger 11:08 AM ;) father? think it should be quite formal -----	Dear Dr. Cuddy, thank you for taking care of my patients during my absence. I am presenting you with a 14 year old girl named Jessica. She came to me with her father because of because of

Figure 42: MO-LRE on register/style (group 1; extract from the coded dataset).

Here, one chat turn constitutes the whole episode on register/style. As can be seen from the text portion, Renate implemented Tanja's feedback directly into the text. This convergence of communication channels shows clearly how every single communication channel in the *Google Docs* document constitutes the communicative reality for the students. This, unfortunately, also shows the drawback of not using screen recording and/or eye tracking equipment as a means of data collection. At this point, it can only be assumed that Renate's change took place after Tanja provided her feedback (both the chat contribution and the text edit were recorded as occurring at 11:08). Also, when a language-related episode came to a satisfying conclusion and the discussed change was implemented minutes later by one of the participants, it is unclear whether the edit to the text was noticed by one (or more) participants (and hence facilitated language acquisition).

The aforementioned examples show languaging in action: "When confronted with a complex problem, we may speak with another person

about the problem and how to solve it (collaborative dialogue, interpersonal communication)[...]" (Swain and Watanabe 2012: 1). According to Storch, "[studies] on whether wikis encourage learners to focus on language have in the main only considered whether learners self or other correct. Research on whether students engage in languaging such as asking for confirmation about the use of a particular structure or word, providing explanations for amendments made, which may occur in the discussion/chat pages of the wiki, are relatively rare" (Storch 2013: 145). My data shows that languaging, as a catalyst for language acquisition, does take place during synchronous collaborative writing. By 'talking it through', learners notice certain phenomena as they reflect on them consciously, which may lead to internalization and learning of these phenomena.

4.3.3.4 Content structure and coherence

Discussions tagged with "content structure and coherence" (or "CS") revolve around "the logical structure of the e-mail: where to put what in the text, sequence of ideas/content" (cf. Table 8: Taxonomy of discussion episodes of the current study.). With a mean of 11.5 tags per group (and a median of 7.5) and a total of 92 tags across all groups, "content structure and coherence" is the fourth most frequent category of discussion episodes (cf. Table 9: Discussion episodes groups 1-8: focus areas and meta-level tags.). Groups one, four, and five covered "content structure and coherence" most frequently with 24, 24, and 15 tags respectively.

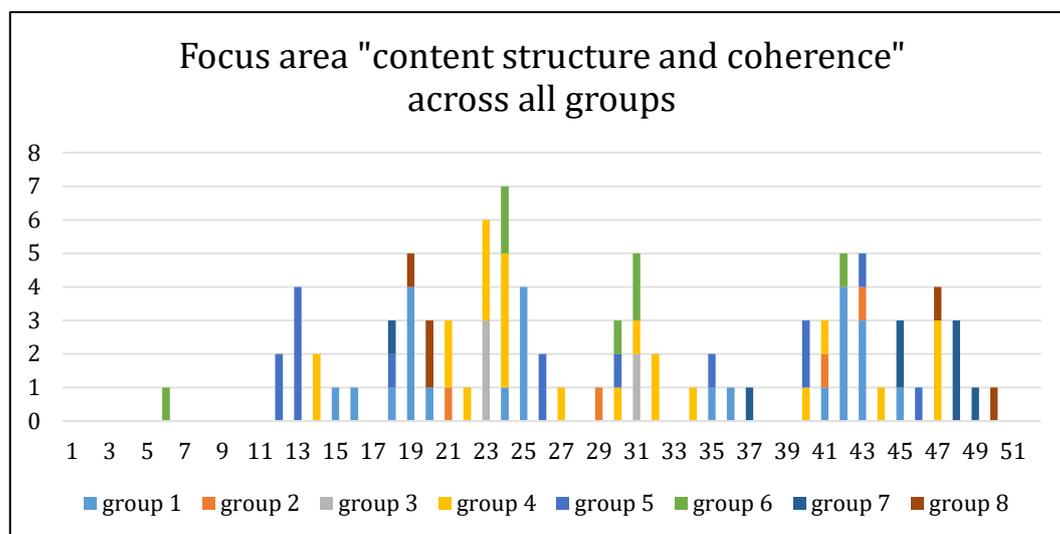


Figure 43: Focus area "content structure and coherence" across all groups.

The pattern of occurrence of the focus area “content structure and coherence” somewhat resembles the pattern of meaning-oriented language-related episodes: little to no activity in the beginning, a peak in the middle of the activity and some adjustments towards the end of the activity. Again, this makes sense as students have to first agree on a work plan and establish a common content basis before they can deliberate language issues and decide on where to put what in the text. Here is an example of a typical discussion episode on content structure and coherence:

Group	Time	Chat
5	13	<p>Anne Gras (11:01) maybe we could add some information about her social life? Just that she’s got a good relationship with her parents, gets good grades and stuff?</p> <p>Anne Mauer (11:01) [...] i would first bring the facts we got into sentences and then add information we remember</p> <p>Sabine Salus (11:01) ok</p>

Figure 44: Discussion episode on “Content structure and coherence” (group 5).

As can be seen from the example, the group discussion centres on which pieces of information to incorporate into the text and where to put them. Again, this task-related meta-discussion does not show evidence of conscious focus on language form, but on meaning (and negotiation thereof).

4.3.4 Meta-level tags

Four types of meta-level tags in two categories were assigned in the data on top of the language-, content- and social-related tags: “German / L1 usage” (“G”) and “Emoticons, emojis, and humour” (“E”) in the “language” category, and “Text section” (“T”), and “Comments section” (“COM”) in the “communication channel” category. These tags provide additional insight on how groups engaged with the collaborative writing activity in *Google Docs*.

	FO-LRE	MO-LRE	ST	C	CS	WM	L	G	E	T	COM	Total # w/o meta	Total # w/ meta
G1	5.7%	18.2%	3.8%	30.2%	15.1%	27.0%	0.0%	2.5%	6.3%	0.0%	0.0%	159	173
G2	5.9%	32.4%	17.6%	17.6%	11.8%	14.7%	0.0%	2.9%	8.8%	17.6%	5.9%	34	46
G3	0.0%	25.8%	22.6%	29.0%	16.1%	6.5%	0.0%	25.8%	22.6%	9.7%	0.0%	31	49
G4	1.8%	23.6%	12.7%	17.3%	21.8%	17.3%	5.5%	1.8%	6.4%	3.6%	20.9%	110	146
G5	0.0%	7.3%	10.0%	29.1%	13.6%	40.0%	0.0%	3.6%	22.7%	10.0%	0.0%	110	150
G6	0.0%	0.0%	6.4%	34.0%	14.9%	44.7%	0.0%	2.1%	17.0%	0.0%	0.0%	47	56
G7	0.0%	6.5%	4.8%	6.5%	12.9%	69.4%	0.0%	3.2%	11.3%	4.8%	0.0%	62	74
G8	0.0%	25.6%	16.3%	30.2%	11.6%	16.3%	0.0%	65.1%	7.0%	18.6%	0.0%	43	82
Mean %	1.7%	17.4%	11.8%	24.2%	14.7%	29.5%	0.7%	13.4%	12.8%	8.1%	3.3%	74.5	97
Median %	0.0%	20.9%	11.4%	29.1%	14.3%	22.2%	0.0%	3.1%	10.1%	7.3%	0.0%	54.5	78
% of total #	2.2%	16.3%	9.6%	24.7%	15.4%	30.9%	1.0%	8.4%	11.7%	5.9%	4.2%	596	776

Table 16: Discussion episodes groups 1-8: focus areas and meta-level tags (percentages).

The course language was English, so all course matters both inside and out-of-class were discussed in English. That is why it was not made explicit in this activity that students were to converse in English. L1 usage did occur in the activity but not to a great extent. Group eight is the exception with approximately 65 percent of chat turns carried out in German. Conversing in one's mother tongue is easier and faster than conversing in an L2, so, given the time constraints of the activity and the constraints of typing as the only means of communication, reverting to German makes sense as a learner strategy here. And, as the grades of the final texts suggest, this strategy might have paid off here: with a total grade of 1, group eight was one of the best performing groups of the course (cf. 4.1 The final texts). Emoticons and emojis illustrate the intended conversational atmosphere. They emphasise the informal nature of the conversation, and help to avoid misunderstanding (cf. Schnitzer 2012: 122). On average, approximately twelve percent of chat turns were accompanied by either emoticons (:-)), emojis (☺) or other expressions of emotion (e.g. "ahhhhhh!").

Regarding channel-related meta-level tags, all groups but one and six initiated discussion episodes in the text portion of the *Google Docs* document. With an average of 8.1 percent, discussions initiated in the text were not especially frequent phenomenon in general but seemingly popular in groups two and eight with 17.6 and 18.6 percent respectively. Here is an example of a discussion episode initiated in the text:

11.30	<p>Jule Botzel 11:30 AM should we put in the dad? I mean that he cant find out nything and seems over-protective</p> <p>-----</p>	<p>...</p> <p>Dear Dr. Cuddy,</p> <p>as I am about to leave for a four-week vacation, I would like to inform you about one of my patients who presented with symptoms including passing out during exercise accompanied by dizziness and an irregular heart-beat.</p> <p>Her name is Jessica Boyd, she is 15 years old and works out regularly. Her father, who accompanied her to the examination, also mentioned her (?)stopped breathing</p>
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Figure 45: Discussion episode initiated in the text by a question mark.

A student used a question mark right after “her” (bottom line) in order to ask for feedback. This subtle way of asking for feedback can be considered very effective as a question mark in brackets is likely to be noticed (as it interrupts the flow of the text) and, at the same time, needs very little effort. Again, this shows the convergence of communication channels as conversational cues enter the text by means of annotations. Comments, as mentioned before, were only really used in group four, primarily to discuss content-related and language-related issues.

11.17		<p>...</p> <p>Treatment plan:</p> <ul style="list-style-type: none"> • Dental check up (due to throwing up and tongue piercing) • talk to parents or friends (weight loss recently) • check her knee, maybe results of overexercising • maybe run a blood analysis <p>Yours sincerely,</p>	<p>Joseph Lehmuss 11.13 AM could u say counsil?</p> <p>-----</p> <p>Joseph Lehmuss 11.13 AM or is it more likely to be used in hospital</p> <p>-----</p> <p>Karina Durman 11.16 AM i googled it and it said check up</p> <p>-----</p> <p>Joseph Lehmuss 11.16 AM alright</p> <p>-----</p> <p>Joseph Lehmuss 11.17 AM -resolved-</p>
<p>Group 4: Chat-Text-Comments (19.7.2014) Karina Durman - Joseph Lehmuss - Markus Schwarz</p>			

Figure 46: Usage of the comments section (group 4).

Although comments seem more geared towards asynchronous activities with their more static nature, they appear to be a very effective way of highlighting a problem in the text and opening up an area where one issue can be discussed in a focussed manner. Given this feature’s more

asynchronous nature (compared to chat⁴⁵), it is understandable that students did not use it more. It would be worth investigating, however, whether guided comments usage (e.g. by means of a collaborative script for the students) would improve collaborative discussion practices in a synchronous collaborative writing activity.

4.3.5 Emergence of the writing process through collaborative dialogue

Participants dedicated roughly 50 percent of their task time to chatting (cf. Figure 28: Communication channel activity groups 1-8 (figures, resulting in total of almost 600 chat turns which were coded according to a content-based taxonomy in order to describe what they were talking about (cf. Table 9: Discussion episodes groups 1-8: focus areas and meta-level tags.). Viewed more broadly, it becomes apparent that students did not converse for the sheer sake of communicating with each other. The task design asked them to collaboratively create a piece of writing. Although collaborative writing processes have not been described by models of the writing process, it is clear that the collaborative writing process must share some qualities with the writing process of individuals. The final product is still a text. Judging by the results of the final texts in this study (4.1 The final texts), the fact that they were collaboratively authored texts was not made obvious by incoherence or lack of comprehensible structure. Therefore, it should be possible to describe the collaborative writing process in a similar fashion as the writing process of individuals. But how?

An obvious starting point to describe the collaborative writing process would be the text revision history of the co-authored documents⁴⁶. But, as discussed previously (cf. 4.2 Communication channel usage), collaborative text editing behaviour in a synchronous context quickly becomes confusing

⁴⁵ This shows again that the synchronous-asynchronous dichotomy does not do justice to state-of-the-art CMC technology. Typing speed, internet lag, and the multimodal capabilities of most modern CMC tools render the synchronous/asynchronous dichotomy useless (cf. Nguyen 2013: 58).

⁴⁶ One could disregard the collaborative dimension and merely look at the changes made to the text as they constitute the writing process. Such an approach could describe the text genesis but would not explain the interactive nature of its creation. A more comprehensive inclusion of the text revision history could, however, add to the analysis of discussion episodes in a possible follow-up study.

as students go back and forth, adding new text, editing existing text, and copying and pasting ideas from one place to another. Also, text ownership as a device to allocate pieces of writing to their authors becomes fluid since the ability to change anything, anywhere, at any time invites peer correction much more than the “only-one-person- can-make-changes at-a-time-” nature of wikis.

Perhaps the discussions among collaborators might provide insights regarding the collaborative writing process: "In a joint problem-solving activity, what normally remains hidden in individually internalized thought may manifest itself in dialogue" (Swain and Lapkin 1998: 321). In other words, when presented with a complex collaborative task to be solved in groups, learners are bound to talk about the task and the individual steps needed to solve it. The contents of their interactions then represent parts of their joint writing process. The data from the four most commonly used discussion tags, “workflow management”, “content”, “meaning-oriented language-related episodes”, and “content structure and coherence” (cf. Figure 37, Figure 38, Figure 39, Figure 43), do, in fact, resemble models of the writing process of individual writers:

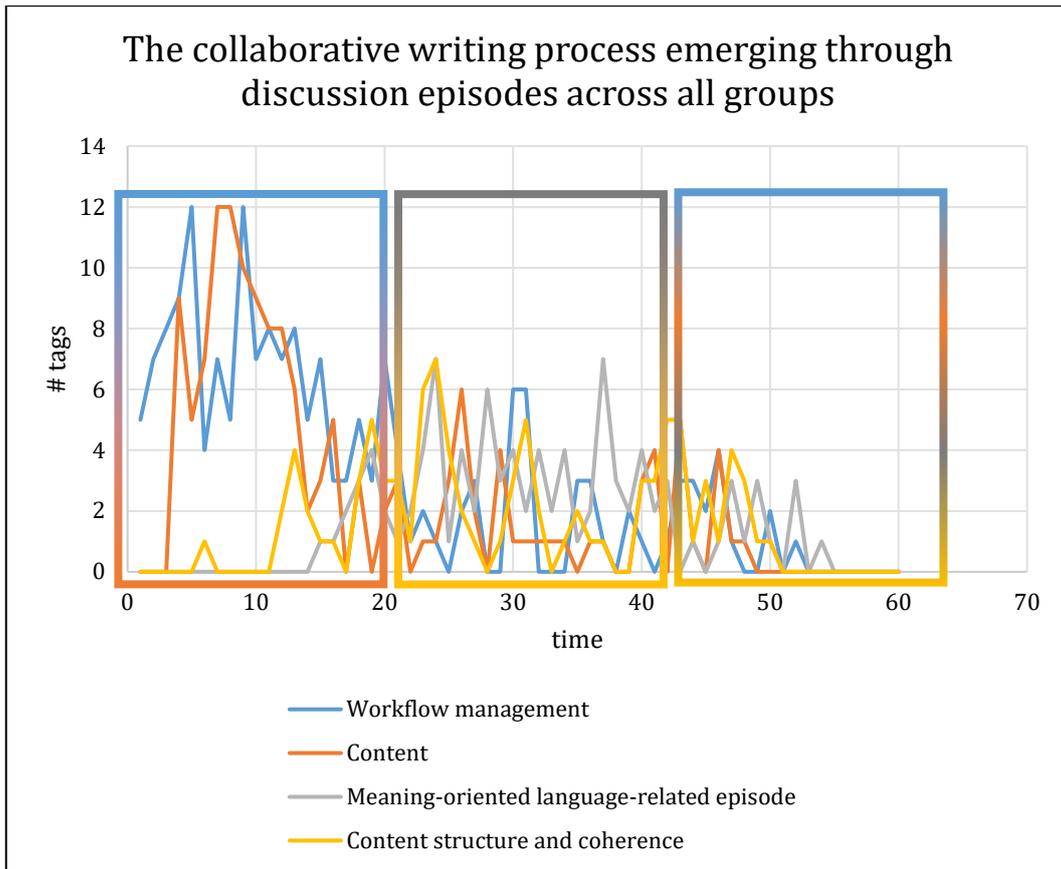


Figure 47: The collaborative writing process emerging through discussion episodes across all groups.

It can be seen that discussion activity decreases over the duration of the activity. This makes sense as collaborators must initially discuss a variety of aspects before actually writing the text. As indicated earlier (4.3.3 High-frequency categories), the types of discussions are dictated by the task requirement: a formal business e-mail regarding a patient handover. In the first twenty minutes (blue-orange quadrant), discussions regarding workflow management (“How shall we do this?”) and content (“What were the symptoms of the patient again?”) dominate the group discussions. Groups have to first agree on a work plan and a common content basis before creating a piece of writing together. This phase resembles Flower and Hayes’ “planning” process where “writers form an internal representation of the knowledge” and which encompasses three sub-processes, which are

“generating ideas”, “organizing”, “goal setting” (Flower and Hayes 1981: 372)⁴⁷.

The second quadrant (grey-yellow; approximately minutes 20 to 40) sees a decline of workflow- and content-related discussions and, in turn, a rise in language-related and content structure and coherence-related discussions. Having established a work plan and a common content basis, collaborators, at this point, are in the middle of putting their texts together. They have to consider where to put the information in the text and how to appropriately express the ideas in the English language (i.e. in accordance with the task requirements). This phase in the writing process could be described by Flower and Hayes’ “translating” element, i.e. “the process of putting ideas into visible language” (ibid.: 373). The “formulate” component would be the equivalent in Zimmermann’s L2 writing model (cf. Zimmermann 2000: 85). Zimmermann’s “L2 problem solving” component as an L2-specific feature would explain the high number of language-related deliberations – a process unique to L2 learners.

From minute 40 onwards (multi-coloured quadrant), there is a decline in all discussion episodes. Towards the end of the activity, users make minor adjustments to the final text cf. (Figure 26: Communication channel activity groups 1-8 (schematic representation). Awareness of their time limit explains why their willingness to engage in discussions decreases gradually. This phase of the process resembles Flower and Hayes’ “reviewing”, “a conscious process in which writers choose to read what they have written either as a springboard to further translating or with an eye to systematically evaluating and/or revising the text” (Flower and Hayes 1981: 374). Again, Zimmermann, having the L2 writer in mind, describes this activity in a more detailed fashion in his model, resulting in three sub-components: “repair”, “read and reformulate”, and “review” – all of which are influenced by the “L2 problem solving component” (cf. Zimmermann 2000: 85).

This description of the collaborative writing process by means of models geared towards individual writers resembles a linear, phase-driven

⁴⁷ Zimmermann’s “plan” component would be the corresponding sub-process in their model (cf. Zimmermann 2000: 85).

description of the writing process. And, in fact, certain steps of a writing activity seem to have privileged positions in the process. Yet, the data shows that these phases (as mere descriptors of different stages a writer goes through) are anything but static:

Within each phase of product development, the writer engages in numerous activities. [...] [T]he term writing process refers to collecting information, planning ideas, translating ideas into text, or reviewing ideas and text [...]. These processes occur repeatedly throughout all phases of writing" (Kellog 1999: 27).

This dynamic nature of the writing process becomes apparent in that none of the aforementioned discussion episodes disappear entirely throughout the activity. Surely, workflow management and content-related discussions play a more prominent role in the first twenty minutes but there is still a need for adjustments regarding content or the work plan later in the activity. Therefore, rather than negating the dynamic nature of writing, the emergence of these three phases is proof of it.

On a macro level, models describing the writing processes of individuals can, in fact, be applied to collaborative writing. The sub-processes of the writing process can be derived from the learners' discussion episodes which emerge during the collaborative writing activity. This observation is in line with Merrill Swain's claims about the potential of student metatalk in language learning contexts: "[...] [M]etatalk is a surfacing of language used in problem solving; that is, it is language used for cognitive purposes. In metatalk, we are able to observe learners' working hypotheses as they struggle toward solving [...] problems" (Swain 1998: 69).

4.3.6 Discussion episodes: Summary of findings

Research question two revolved around the contents of the participants' discussion episodes to determine which aspects of the activity the participants deem worthy of discussion: "What do small groups of L2 students (not) focus on in their task-related meta-discussions"? Knowing what students focus their discussions on tells us a lot about their collaborative practices as discussion time is a valuable resource in a time-constrained activity with typing being the only means of communication. Participants were highly active in this collaborative writing activity. As

mentioned previously, students spent approximately 41.7 minutes of the total task fulfilment time of 51.1 minutes on average (approximately 82 percent) on either chatting or contributing text to the document (cf. 4.2.3 Communication channel usage: summary of findings). Approximately 600 tags were assigned to individual discussion turns. Discussions took place primarily in the chat section of the document with 536 turns. Only 35 discussion turns took place in the text section and 25 turns in the comments section. A glimpse into the participants' use of text annotations revealed interesting practices (like putting a question mark behind a term or phrase one is unsure about) which exploit the possibilities of the medium and save time and space at the same time.

Participants dedicated little time to talking about surface-level issues like form-oriented language-related episodes and layout. Given the possibility of easily editing text at any time, this is not surprising. The very high language level of the participants implies that they would not have to discuss surface-level problems like spelling or correct tense forms to begin with. Layout questions were also rendered superfluous by the task design, which suggested a particular format.

Participants talked a lot about workflow management and content-related questions. This is completely in line with other studies on collaborative writing like Kessler 2009 or Kessler et al. 2012, where students' revisions⁴⁸ mainly involved content rather than form. In Storch's study on collaborative writing, the students' meta discussions were analysed and also showed a strong bias towards content (Storch 2005). Interestingly, the two worst performing groups in terms of the final grade (groups one and five) dedicated an above average amount of time to workflow- and content-related discussions. Groups who fared well did not cover these categories as much (in fact, high performance groups chatted less than groups who performed worse in general). The fact that groups one and five spent so much time discussing how to approach the task and establishing a common content basis may explain for their sub-par performance in the final text. They might

⁴⁸ Actual revision activity in the wiki pages is not the same as talking about these changes; still, carrying out changes of a certain nature speaks of the focus the participants wanted to create.

have simply lacked the time to refine their writing in terms of content/structure and language. Their final texts lacked vital pieces of information and their language less accurate than the others. The fact that students had little to no guidance on how to do this activity was by design. This study aimed to explore the synchronous collaborative writing process of L2 learners, which implies a rather open task design that influences the collaborative practices as little as possible. This inevitably leads to some groups struggling with such a complex task. A collaborative script and set of guidelines on how to work through such a complex task in a collaborative manner using shared documents technology to communicate might be in order. Bad performance in the “content” area in the final texts (and the urge to talk about it in the discussion episodes) probably indicates that these groups did not put enough effort into the preceding homework assignment about related symptoms. Establishing a common content basis before the activity could lead to a more successful task fulfilment as communicative resources would be freed up for other aspects of the writing such as language-related issues. Talking about language-related issues, meaning-oriented language-related episodes were the third most common discussion topic among all groups. Students engaged in languaging, and hence, collective scaffolding to come up with solutions they probably would not have been able to find without the help of their peers. This conscious reflection on language is conducive to language acquisition as it fosters noticing, a prerequisite for internalization (= learning) of particular language phenomena. As this activity was carried out in a synchronous fashion, student interaction was bound to happen, increasing the opportunities for collaborative dialogue compared to asynchronous collaboration. The written nature of the interaction adds further value compared to oral collaboration: “[Synchronous computer-mediated] interaction results in an increase of textual production as opposed to oral production, an increase in opportunities for practice in writing, and experimentation with alternative phrasings within the full context of the text” (Kessler et al. 2012: 100).

Two caveats are in order, however: First, the outcomes of the discussions were not analysed. Theoretically, students could have agreed on

an ungrammatical form and put it into the writing. Consequently, an ungrammatical form could have been fossilised. Alternatively, students could have agreed on a certain phrase or form with no one putting it into writing. Second, an exploratory, process-oriented research approach, such as the one taken in this study, cannot prove actual learning is taking place. Looking at instances of conscious language-related reflections are not proof of internalization of these phenomena. A longitudinal study with several phenomenon-specific tests (for example) would be needed in order to determine whether the phenomena discussed in languaging are internalised by the learners. Language-related discussions and their language acquisition potential aside, students produced a substantial amount of written language in a short period of time, be it the actual texts or discussions on a plethora of activity-related topics. Therefore, even without language-focussed metatalk, productive language use in itself may provoke noticing and hence lead to language acquisition (cf. Swain 1998: 67). Consequently, this collaborative writing activity can be considered a rich site for second language acquisition.

Finally, the analysis of discussion episodes revealed something else: Collaborators verbalise the writing process. The type, amount, and time of occurrence of discussion episodes created a representation of well-established writing models geared toward individual writers. This analysis also proved that, while a certain sequence of actions in the writing process seems to be prevalent, the writing process is dynamic in nature. Certain sub-processes like workflow management, for instance, tend to peak in the beginning of the activity but never disappear entirely in the course of the activity as writers might have to cycle back to adjust the work plan and negotiate it accordingly with their peers. Again, one caveat is in order here: While "[...] the window into intramental processing is more transparent than the window provided through introspective techniques" (Swain and Lapkin 1998: 322), collaboration does not just introduce the possibility to observe mental processes in a verbal form. According to Swain and Watanabe, there are two types of languaging: private speech, i.e. when we 'talk' to ourselves about a problem, and collaborative dialogue, i.e. when we talk to others (cf. Swain and Watanabe 2012: 1). When students talk about a problem which is

to be solved collaboratively, they will presumably say things which reflect their mental processes regarding the problem (here: task) in question. But the sheer fact that there are two or more people interacting also triggers several other conversation topics which would never surface in the private talk of an individual writer. Nevertheless, these 'other conversations' are also language output, and worth having from a second language acquisition perspective, as they are possible sites for language development as well.

4.4 The participants' perspective

Research question three concerned the participants' perspective primarily regarding their collaborative experience: "How do groups of L2 students experience the synchronous collaborative text creation process with *Google Docs*"? This investigation serves a dual purpose: First, the participants' perspective is a vital part of the exploratory research design. As this study aims at describing the collaborative practices at work in a synchronous collaborative writing activity, the participants engaged in writing (and their experience) are of interest by default. Second, experiences, attitudes, and opinions of the participants can provide valuable insights in order to interpret the findings from research questions one and two. In this chapter, the results of the pre- and post-activity surveys will be presented and discussed. These findings add further insight to the results of research questions one and two and provide broader implications for technology-mediated collaborative writing in an L2 context.

4.4.1 Prior experience with shared documents technology

The first group of questions in the post-activity survey was about the participants' prior experience with shared documents technology (cf. Appendix, 7.4.1ff.). Question 1a was "Have you ever used *Google Docs* or similar tools before?". A total of 24 answers were recorded. Eighteen participants answered "No" and six participants said "Yes", which meant that 75 percent of all participants had never before encountered shared documents technology capable of synchronous collaborative editing. When asked more specifically in question 1b "Have you ever worked on a text with somebody at the same time (= synchronously) using *Google Docs* or similar tools?", nineteen students answered "No" and five students said "Yes".

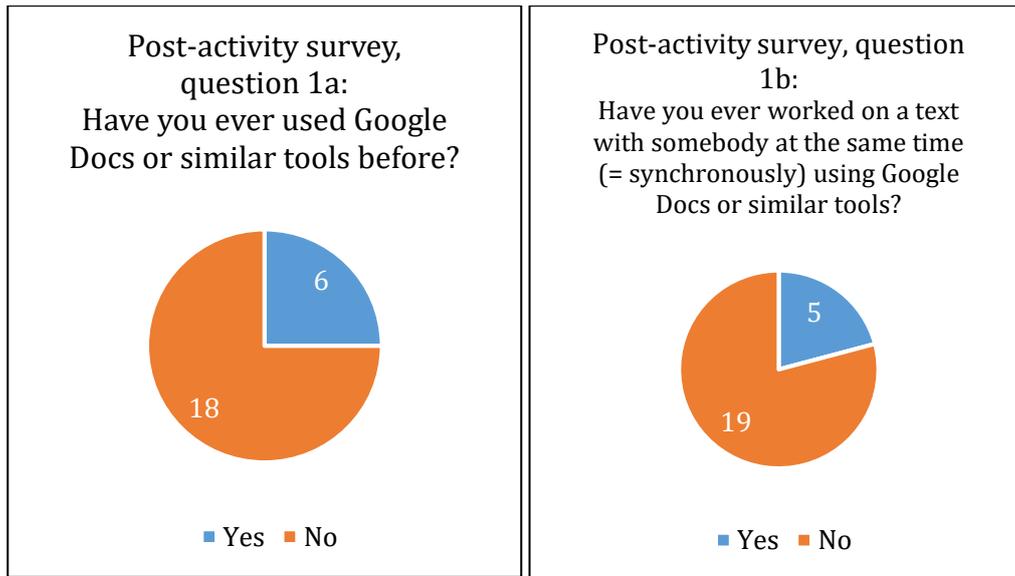


Figure 48: Visualisation of participants' replies post-activity survey questions 1a and 1b.

Finally, when asked which tools they had used ("1c If you answered question 1a with "Yes": Which collaborative tools have you used?"), six students named the following: *Dropbox* (1x), *Facebook* (1x) *Google Docs* (2x), *Google Drive* (3x), *Microsoft Office 365*, *Microsoft One Drive* (1x). As students probably do not know the difference between *Google Drive/Microsoft One Drive* (the cloud-based storage solution where the collaborative documents are hosted), *Google Docs* (the web-based word processor used in this study) and *Microsoft Office 365* (the *Microsoft Office Online* suite of programs which includes a web-based version of *Microsoft Word* which caters for synchronous collaboration), these answers are counted collectively (as "5x *Google*" and "2x *Microsoft*"). In conclusion, the 25 percent of the group who had prior experience with shared documents primarily used programs from *Google* or *Microsoft*. Interestingly, *Facebook*, primarily one of the world's largest social networks, was mentioned. *Facebook* introduced a so-called "Docs" feature in 2010 based on *Microsoft's Office Online* technology (cf. Schofield 2010). Also, *Dropbox*, typically known for its cloud-based storage solution, was mentioned once. Its *Google Docs* competitor, *Dropbox Paper*, was not available to the public at the time of the data collection (cf. Pierce 2015), so the student who mentioned it probably referred to its ability to simply share documents with others (rather than editing them at the same

time). The remaining 75 percent had never worked together using shared documents technology.

4.4.2 Task design in general

The second group of questions was about students' perception of the task in general, specifically about the task time allotted and whether the task instructions were sufficiently clear. When asked about the task time in question 2a (cf. chapter 7.4.4), fourteen students replied the given task time was "just right", eight students said it was "too short" and two students answered the task time was "too long". To sum up, sixteen out of 24 students (or two thirds) did not run into time management issues. However, one third did find the task time too short. Six of the eight students, who indicated they found the task time too short were members of groups one and five. This is worth mentioning as these were also the groups who chatted the most and spent a vast amount of time discussing workflow management and content-related questions. This is also in line with the findings from the final texts where both groups scored lowest compared to the rest of the cohort. Again, clearer guidelines on how to work together in a synchronous collaborative fashion seem in order. For 17 out of 24 students, the task instructions were clear. On a scale from one to six with one indicating "not clear" and six indicating "very clear", these 17 students selected "6 (very clear)". Five students chose "5" and one student chose "4".

Given the complexity of the task (create a patient handover e-mail collaboratively in a synchronous fashion using only computer-mediated communication facilities for interaction) and the relatively tight timeframe, it can be assumed that the general framework of the task was set up adequately. However, two out of six groups ran out of time. Groups one and five seem to have spent too much time on chat discussions which affected their final texts badly. They realised this problem themselves in the survey. As pointed out above, a collaborative script or a set of guidelines should be applied. Since this study is exploratory in nature, detailed instruction were purposely omitted in order to find out how students engage with such a situation 'naturally'.

4.4.3 Collaborative experience and possible applications

In this chapter, answers to the third group of questions in the post-activity survey are analysed. As all three questions were open questions, the answers offer more room for interpretation and are therefore dealt with in three sub-chapters.

4.4.3.1 Synchronous collaborative writing experience

In question 3a, students were asked how the synchronous nature of the task affected group work: “How did the synchronous nature of the task (everybody can write/chat/comment at the same time) affect your group work”? (cf. 7.5.6 Survey question 3a). Since the question was open, answers were categorised with a content analysis approach (cf. 3.4.1.2 Post-activity survey: Prior exposure, task judgement, activity experience). Contributions were first divided into two categories: “positive” and “negative”. If a participant stated both positive and negative aspects of the activity in one contribution, the positive parts of the contribution were put into the category “positive”, the negative parts of the contribution were put into the category “negative”. The participants’ positive and negative feedback was then subdivided inductively based on their replies. The following categories emerged from the data:

Type	Category	Description	Example
Positive	General	is generally good	“it was good”
	Efficiency	saves time / is easier	“saved time”
	Idea generation	facilitates idea generation	“I think it helps finding new ideas and well-structured sentences”
	Language-related peer feedback	facilitates peer feedback on language use	“everyone had their own part to focus on with the others checking for mistakes or better wording”
	Multimodality	enhances communication by	“It was helpful to have an extra chat to discuss

		its multimodal nature	the text”
	Transparency	makes it transparent who contributes what	“I liked the fact that we always knew who was adding stuff”
Negative	No face-to-face	lacks oral interaction	“it was rather complicated as we couldn't talk to each other and could not find a solution together”
	Confusing	is generally confusing	“It was a little chaotic at first”
	Time-consuming	takes more time than face-to-face interaction	“I think the velocity of group was reduced a bit”

Table 17: Coding of participant replies (post-activity survey, question 3a).

Twenty-four answers were recorded and a total of 45 category tags were assigned; The full corpus of coded answers can be found in the appendix (cf. 7.5.6 Survey question 3a). The participants’ contributions indicate an overall positive impact of the synchronous nature of the interaction on their group effort:

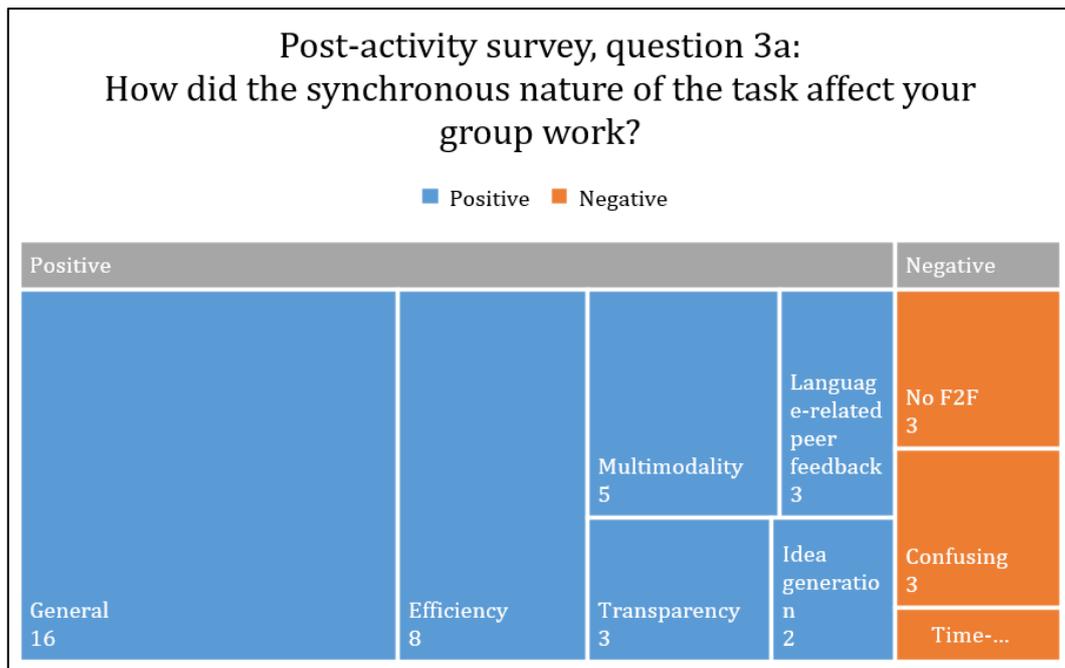


Figure 49: Visualisation of participants' replies post-activity survey question 3a.

As can be seen in the diagram, the overall feedback was positive with 38 (of a total of 45) tags being positive and only seven being negative. There was a lot of general, unspecific positive feedback (16 tags) with replies such as “we did quite well” or “It definitely had a positive effect”. More interestingly, the second-largest positive category was “efficiency” with eight mentions, which seems surprising as typing typically takes more time and effort than just saying things out loud. This distinctive feature of synchronous computer-mediated collaboration, however, could be the very reason that students assess it as a more efficient way of working together: As typing does take more time than just saying something, the computer-mediated nature of interaction (and the limited task time) force students to prioritise what they deem necessary to discuss (and what not). Superfluous, unfocused discussions become harder to justify in the tight time frame of the task and, as has been indicated in the analysis of discussion episodes (cf. 4.3.3 High-frequency categories), can possibly lead to worse task performance.

The categories “multimodality” (five tags), “transparency” (three tags), and “language-related peer feedback” (four tags) seem to provide plausible explanations why students deemed the synchronous computer-mediated collaboration overall positive and effective. First, the third-largest positive category, “multimodality”, was assigned five times with statements such as

“there are lots of means to communicate, like commenting and chatting, making it a lot easier to do the task”. Apparently, having different means of computer-mediated interaction available, even though all written, facilitates synchronous collaboration. Utterances like “it was helpful to have an extra chat to discuss the text” indicate that students perceived the chat and comments facilities as useful meta-tools to discuss and collaboratively create the product, similar to an oral discussion (i.e. the meta-level) of a poster or a text in a face-to-face setting. Second, “transparency” as a benefit was mentioned three times, always in conjunction with other categories. The categories “transparency” and “efficiency” occurred together twice, e.g. “I liked that I was able to read the others text. That way any overlap or repetition can be avoided”. Once, the categories “transparency” and “multimodality” occurred together: “I liked the fact that we always knew who was adding stuff and that we could discuss things in the chat”. This indicates that the constant availability of written information combined with various means of interaction might counter-act the aforementioned slower rate of written interaction because it helps avoid “overlap and repetition”. Other studies have found that such transparency, made possible through technology, also has the potential to improve the overall quality of the final product:

Transparency can improve quality in three different ways: Firstly we may want to provide better quality when we know that others have access to the information and contributions we provide. Secondly, we may learn from others when we have access to their data and contributions. Thirdly, we may receive feedback from others when they have access to our work. However, students engaged in individual or group work in traditional courses are not aware of the activities of the other students within a course (Baltzersen 2010: 794).

As this study does not measure effective learning over a longer period of time or compare co-authored texts to texts of individual writers, this potential can neither be confirmed nor refuted.

Third, the category “language-related peer feedback” has been assigned four times with statements such as “everybody could easily correct minor mistakes” or “we could work great together and help each other out with grammar, vocabulary or structure”. Surely, the ease of use and the

synchronous editing capabilities of *Google Docs* make it feasible to “correct minor mistakes” directly in the text, again without instigating discussions about every single language item and adding to the efficiency of synchronous computer-mediated collaboration. This can also be seen in the analysis of the discussion episodes (cf. 4.3.2 Low-frequency categories): Surface-level changes like form-oriented language-related episodes or layout were almost never discussed although these aspects, of course, were part of the students’ editing activities in the text.

The category “idea generation” was only assigned twice. The answers were: “I think it helps finding new ideas and well-structured sentences” (the second part was assigned the category “language-related peer feedback”) and “It was good because everyone could bring in ideas and was then brought together”. Synchronous computer-mediated communication as a means of creative idea generation is well-supported by the literature. Although “[...] there are time and typing pressures that adversely affect the complexity of message production [...]; [yet,] [...] [the] use of simple cohesive strategies such as question-and-answer adjacency pairs and lexical repetition [...] [make synchronous text-based CMC] well-suited for creative idea generation, relaxation and fun, and for stimulating interaction among people who might not interact otherwise” (Herring 2013: 262–263). Finding new ideas which everyone can contribute to could, in part, also be ascribed to the equal distribution of communication facilities among all team members: Everyone can contribute at any time and to any part of the document using their communication channel of choice. Compared to a similar synchronous collaborative activity in a non-technology-mediated setting, it becomes apparent that only one person (with physical access to the sheet of paper or keyboard of the one computer) would be able to write at a time with the others only able to give feedback or input on what to write. Such physical constraints seem to matter. All [TRANSPARENCY] tags, four of the eight [EFFICIENCY], and two of the five [MULTIMODALITY] tags come from the best performing groups in the activity (groups six and eight). Groups six and eight seem to have exploited the affordances of synchronous collaborative writing best and saved time and effort by paying attention to what was being

edited and by whom. Consequently, they did not have to talk it all through. This is also in line with the findings of research questions one and two, as groups six and eight spent only nine minutes (on average) on chatting versus 32 and 25.3 minutes respectively for groups one and five.

Regarding negative feedback, there were a total of seven tags which contained criticism of some sort. The category “confusing” was assigned three times and covered non-specific critical feedback on the perceived confusing nature of the task, such as “It did work pretty well - we split some tasks, discussed problems and helped each other, [POSITIVE] though sometimes it was difficult to follow on the chat. [CONFUSING]”. As seen in this example, the critical utterances were almost always part of an otherwise positive remark (cf. 7.5.6 Survey question 3a). The other major critical category, “no f2f”, was also assigned three times. It co-occurred twice with positive statements and once alone. One student (Portlanger, group one) pointed out the artificiality of the task situation (using a tool capable of tele-collaboration in-class): “it was good [POSITIVE], a bit weird to do it online even though we are sitting in the same room...that method would have been very helpful for homework I think [NO F2F]”. As has been pointed out before (cf. 3.2.3.2 Task set-up: Task type, social configuration, technical realisation, task goal), gathering a sufficient amount of data on synchronous collaborative writing requires a certain amount of artificiality: In order to document all meta-discussions around the collaborative product (one key research aim, cf. 2.5), it becomes necessary to control certain task variables, in this case time and location⁴⁹. Albeit in part artificial, this task creates ample opportunities for learner interaction, a facilitator of second language acquisition (cf. 2.1 The SLA perspective: Interaction and learning) and the key component in building communicative competence, i.e. “the ability to communicate effectively in English” (Hedge 2008: 44). The last piece of critical feedback was one mention of the category “time-consuming”: “I think the velocity of group was reduced a bit. [TIME-CONSUMING] Nevertheless it was easier for oneself to concentrate on the part working on individually. [POSITIVE]” (participant “Merklin”, group seven). Although not stated

⁴⁹ Nevertheless, true tele-collaboration is a valuable asset of shared documents technology.

explicitly, it may reflect the perception that written computer-mediated communication is, by nature, more time-consuming. Again in line with findings from research questions one and two, the worst performing groups (one and five) were most critical of the activity, particularly group five. In fact, all three group members in group five called the experience “confusing”.

In summary, students perceived the synchronous computer-mediated mode of collaboration as having a positive impact on their group effort with 38 out of 45 assigned tags (approx. 84.4%) in positive feedback categories. Although the majority of positive tags were unspecific (“positive”, 16 tags), the specific mentions primarily revolved around a perceived improvement of “efficiency” (eight mentions) and the affordances of the multimodal environment with its combination of chat, text, and comments (“multimodality”, five tags). The tag “transparency” co-occurred with general “positive” feedback but also as an argument for efficiency as it helped avoid repetition and unnecessary talk, as did “language-related peer feedback”. Negative feedback was limited (7 out of 45 assigned tags, i.e. approx. 15.5 %), either unspecific (“confusing”, three tags) or critical of the lack of face-to-face interaction (“no f2f”, three tags).

4.4.3.2 Student assessment of the task design

In question 3b, students were asked how, if at all, they would change the way the activity was carried out (“If you could change the way this task was carried out: How would you do it?”, cf. 7.5.7 Survey question 3b). Since the question was open, answers had to be categorised with a content analysis approach (cf. 3.4.1.2 Post-activity survey: Prior exposure, task judgement, activity experience). When several categories were assignable, several tags were assigned to a single student reply. The following categories emerged from the data:

Category	Description	Example
No change	No change is required	I think it was good the way it was - nothing to change!
Do not know	Cannot say how to change it	do not know

More time	Need more time	Actually, I'd just give the students a bit more time... like 10 minutes or so.
Make it F2F	Make the task face-to-face, i.e. include oral interaction	Everything is being discussed personally and one person is writing.
Better instructions	Need better instructions	maybe read an example e-mail before, so we had a better idea what it should look like
Add audio chat	Include an audio-chat in the activity design	perhaps a voice chat
Make it an online task	Make the task online / part of homework	I am actually quite impressed with the program. As I said before I believe it is a great way to be efficient. If I could change something I would add an audio chat to it in order to communicate with my teammates without losing extra time writing them messages. We could talk while writing. This way we could even be more efficient. (P.S.: This would of course work best if you're the only one in the room. Otherwise you would be distracted by people around also talking to their teammates!) ⁵⁰

Table 18: Coding of participant replies (post-activity survey, question 3b).

Twenty-four answers were recorded and 25 category tags were assigned; The full corpus of coded answers can be found in the appendix (cf. 7.5.7 Survey question 3b). Approximately half of the replies indicated no need for change:

⁵⁰ This reply was tagged [ADD AUDIO CHAT] and [MAKE IT AN ONLINE TASK].

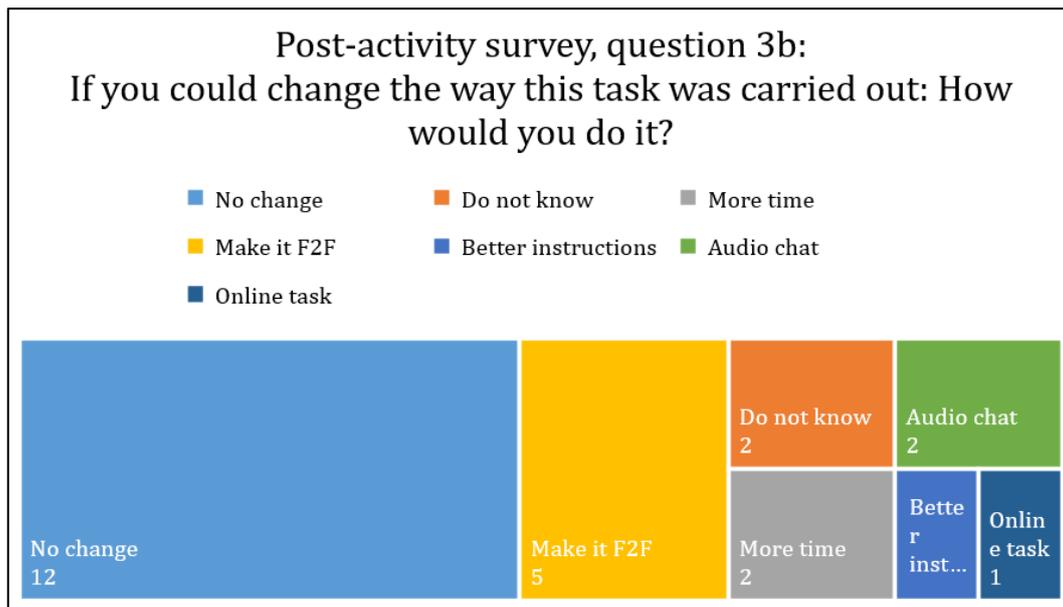


Figure 50: Visualisation of participants' replies post-activity survey question 3b.

More than half (14) of the submitted participant replies (25) imply no need for change (12) or participants do not know how to change the activity. The remaining 11 suggestions on how to change the activity design are dominated by the suggestion to make the activity face-to-face or at least include oral interaction (five tags "make it f2f"). Two students asked for more time, two students suggested the inclusion of an audio chat facility and one of them suggested that "[it] would of course work best if you're the only one in the room. Otherwise you would be distracted by people around also talking to their teammates!" (student "Sole" from group 6; tagged "make it an online task"). The same student also suggested showing an example e-mail (tagged "better instructions").

All in all, the results from question 3b underline the perceived positive impact of using synchronous shared documents technology and the high level of acceptance by the students, as shown in question 3a. The five mentions of the category "make it face-to-face" and the two mentions of "add audio chat" correlate with the seven critical mentions from question 3a (three times "confusing", three times "no face-to-face", once "time-consuming"); making the activity face-to-face or at least including some sort of audio conferencing would eliminate the perceived confusion of synchronous written interaction and, perhaps, make it even more time-efficient (according to the student feedback). Interestingly, groups who performed well in the activity (six and

eight) and those who performed worst (groups one and five) were equally critical with their feedback.

4.4.3.3 Other applications of shared documents technology

In question 3c, students were asked to imagine other possible use cases for synchronous collaborative technology (“How would you (possibly) use this kind of synchronous collaborative technology in your private or personal life?”, cf. 7.5.8 Survey question 3c). Since the question was open, answers had to be categorised in a content analysis approach (cf. 3.4.1.2 Post-activity survey: Prior exposure, task judgement, activity experience). Data-driven categories emerged from the student replies. When several categories were assignable, several tags were assigned to a single student reply. The following categories emerged from the data:

Category	Description	Example
Presentations	Using this technology for group presentations	maybe if I had to do presentations together with others
General team work	Using this technology for all kinds of digitally mediated team work	I would use it in order to work with other people, who are not in range to meet them personally while being in need to work with them.
Event Planning	Planning events with this technology	maybe for planning events
Various	Different suggestions not assignable to categories	not really I think, still prefer personal conversation

Figure 51: Coding of participant replies (post-activity survey, question 3c).

Twenty-four answers were recorded and a total of 30 category tags were assigned; The full corpus of coded answers can be found in the appendix (cf. 7.5.8 Survey question 3c). The majority of suggestions regarding other applications of this technology concerned presentations and general teamwork:

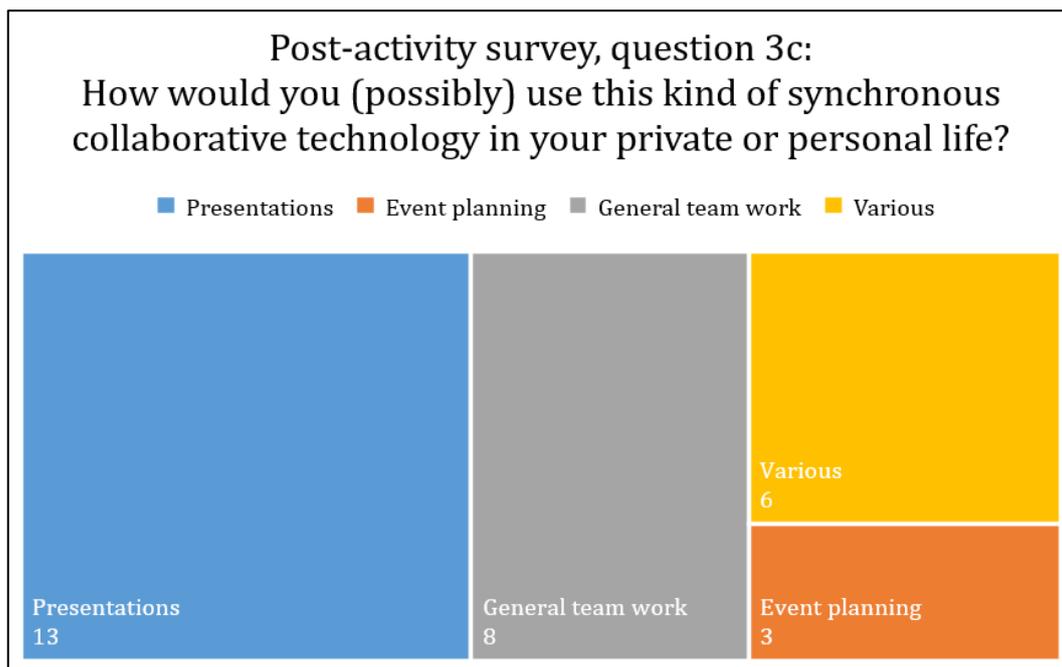


Figure 52: Visualisation of participants' replies post-activity survey question 3c.

In 13 student statements, “presentations” are mentioned explicitly as a suggested application of synchronous collaborative technology. It may come as a surprise that students, coming from a web-based word processor in this activity, suggested “presentations”. However, students were told in the tutorial part of their documents (cf. Figure 14: *Google Docs* tutorial.) that *Google Docs* is basically *Microsoft Word* with synchronous editing capabilities and a chat. It was added orally that there are also *Google* programs for presentations and calculations with similar capabilities. The tag “general team work” has been assigned eight times; here students were rather unspecific and suggested e.g. “working on a project in a group”. Three times, it was suggested that synchronous collaborative technology could be used to plan events. Six suggestions did not fit any particular category and were therefore summarised under the category “various”. Students suggested “collaborative summaries”, “sharing information”, doing the final role-play of the course using this technology or they suggested nothing as they “still prefer personal communication”. Interestingly, one student said “I believe we already do that through Facebook, Whatsapp and similar online technologies. I believe it has the same effect of efficiency (Student “Sole”, group six)”.

In summary, students think that the best applications for synchronous collaborative technology are group presentations and any type of teamwork

in general. The various other suggestions like “collaborative summaries” and “planning events” imply that synchronous shared documents technology has a real potential to be a useful tool for collaboration in private and institutional settings.

4.4.4 The participants’ perspective: Summary of results

The analysis of the students’ experience aimed at getting an even broader perspective on the phenomenon of synchronous collaborative L2 writing and, at the same time, gaining additional insight into research questions one and two.

Students had little to no prior experience working together in such a way and, except for basic instructions in their documents, did not receive any training. Still, all groups managed to satisfactorily complete the complex collaborative activity in the given time frame. This is good news as technology seems to have become a useful tool for the participants and not an impediment. The accessibility of *Google Docs* (familiar word processor design plus an easy-to-use chat function) can also be considered a facilitating factor here.

In general, students felt very positive about the synchronous collaborative writing activity. The main advantages, according to the students, were time efficiency, transparency, and the multimodality aspect of the activity. Groups who scored best in the activity (groups six and eight) also appeared to be most successful at exploiting these features of synchronous shared documents technology: They saved time by paying attention to their peers’ work, making longish discussions superfluous – and said so in the survey. The comparably small amount of negative feedback revolved around the possibly confusing nature of synchronous collaborative writing and the lack of face-to-face interaction. Students suggested changes to counter-act the lack of face-to-face interaction, namely adding audio and/or video chat capabilities or just by making the activity face-to-face. Still, 14 out of 24 students did not see the need for any change or could not suggest a way to improve the activity.

Looking at the students’ assessment of the task design, it is noteworthy that one third of the students found the allotted task time too

short. In line with the assumptions put forward regarding research questions one and two, these were primarily the students who chatted most and who scored worst in the final texts. These groups seemed to have problems figuring out how to work together in such a task setting and they lacked vital content information from the homework assignment and the preceding workshop (which is why they dedicated so much time to discussing these aspects). Still, two thirds of the participants did not seem to have time management issues. When asked about possible applications of this way of working together, the majority of students named “group presentations” as the best application they could think of outside of the context of the study.

Overall, the student perspective proved to be a valuable source of input for better understanding the findings from research questions one and two. Also, it showed that this type of activity works and is meaningful to the participants engaged in it. However, ‘offline’ student assessment of their own behaviour (i.e. after the fact) is always open to interpretation by the students. Talking about one’s experience in an activity and experiencing the activity are two different things as this feedback data is influenced by the selection of certain aspects by the participants and the research design (cf. Deppermann 2008: 21).

4.5 Limitations of this study

Carrying out a research project (or any project for that matter) comes with limitations, primarily regarding time and available resources. This PhD project was carried out at all levels by the author himself, including teaching the course, creating the activity, implementing the activity (both technologically and pedagogically), creating the research design, collecting the data, and analysing the data. The primary focus of a research project dictates the specific aspects to be investigated and makes others less relevant. With that in mind, the following chapter reflects the limitations of this study regarding sample size, data collection, and depth of data analysis.

4.5.1 Sample size

In line with other studies in the field (cf. 2.4.3 Collaborative L2 writing with technology: related research studies), this study has taken a qualitative, exploratory approach. This has resulted in a relatively small sample size of 24 students. Behavioural practices found in the data of such a qualitative study do not actually represent the whole group of people these participants are a part of. Qualitative research does not claim to result in a 100 percent accurate, scaled-down image of reality. A qualitative research approach aims to identify theoretically relevant combinations of certain features of certain phenomena in a specific context; by doing so, one is able to identify, describe, and explain new phenomena as they deviate from existing concepts (or do not) (cf. Kelle and Kluge 2010: 55). Although the results of this study cannot be generalised to a set of assumptions that hold true for all synchronous computer-mediated collaborative writing practices, they point to tendencies of collaborative practices in such contexts. An attempt has been made to reference the very specific context of this study when interpreting the data and to imply the limitations regarding the generalisability of the findings. Additionally, as pointed out earlier, the dual role of teacher and researcher played a major role in the research design process. The author of this study firmly believes that research in the educational field should be carried out by educators, or in conjunction with educators, to better connect research and

practice. Qualitative, small scale studies which can be carried out within the context of teaching have a better chance of being utilised by practitioners.

4.5.2 Data collection

The decision was made to primarily rely on *Google Doc's* built-in recording facilities and compose a dataset based on this data alone. Screen recording, eye tracking technology, and video recordings could have enriched the data to a great extent. Considerable data was lost due to the limitations of *Google Doc's* built-in recording facilities: Investigating the participants' clicking and scrolling behaviour could have provided interesting insights regarding their reading and noticing behaviour. Also, clicking into the text of another person could function as a pointing device which, again, could induce noticing. Screen recording could have shed light onto the participants' use of other resources outside of the document, for example, the use of dictionaries. Yet, all these technologically sophisticated ways of collecting more detailed data have two things in common: First, they are rather complicated to implement. Second, they distort the actual classroom experience. In line with Flick, I tried to adopt the necessary means to answer my research question without significantly distorting the actual learning experience (cf. Flick 2011: 373). I believe that the 'depth of data collection' was sufficient to explore the rather new phenomenon of synchronous collaborative writing.

4.5.3 Depth of data analysis

Although this study is qualitative in nature with a limited sample size, the depth of data analysis cannot be limitless due to time and resource constraints. I tried to gradually narrow the research scope from a global description of channel usage to a content-related analysis of students' actual collaborative practices (and their interpretation thereof) in order to grasp the nature of this new way of working together. Data points that seemed most relevant were analysed more thoroughly (e.g. meaning-oriented language-related episodes) and connected to others. However, analysis remained primarily at a group level, rather than focussed on the contributions of individuals. Additionally, individual differences among the student cohort (language level, mother tongues, etc.) were not included in the

analysis. This somewhat 'superficial' approach was chosen deliberately. I was interested in the collaborative practices of groups of students – not the contributions of individuals. In line with the radically empirical approach taken by conversation analysts, I also decided to rely primarily on overt phenomena represented in the data rather than 'looking into people's heads' (cf. Deppermann 2008: 82–83). Finally, the text revision behaviour was only included selectively and not of primary concern. Although the lines between revision and addition of text blur in a synchronous setting, I believe that the interactive aspect of this type of collaboration, as manifested in the students' discussions, can provide relevant insights into the investigated phenomenon of computer-mediated collaborative writing.

5 Conclusion, implications, and outlook

This final chapter has three aims: First, all findings from this empirical study are incorporated in the conclusion. Second, the qualitative exploration of the phenomenon of synchronous collaborative L2 writing has uncovered important implications for foreign language education. Their significance for both teaching and research will be discussed. Third, an outlook with broader implications for technology, education, and culture is given.

5.1 Conclusion

Understanding how EFL students interact with each other in the L2 to solve a complex language task can help us understand the language learning potential of certain activities and methods in the EFL classroom. As was argued in the introduction, technological development which actually changes the way we interact with each other (or with technology) is relatively rare. Watching a *YouTube* film in a 2017 classroom is essentially the same experience as watching a VHS video in 1987. However, an investigation of shared documents technology with synchronous capabilities is particularly relevant as this technology has the potential to truly add value to the language classroom and learning research. This study revolved around collaborative L2 writing with technology, which “[...] involves learners interacting in pairs or small groups on a writing task. Thus, the two key components in collaborative writing are verbal interaction and writing (Storch 2013: 6)”. In the following, a brief summary of the theoretical and empirical findings of this study is given.

This qualitative study explored the synchronous collaborative L2 writing process of eight small groups of L2 learners in a computer-mediated environment. Studies on synchronous collaborative writing with shared documents are rare to non-existent. Most (exploratory) research on technology-mediated collaborative writing investigates asynchronous practices (e.g. Kessler and Bikowski 2010; Kessler et al. 2012; Judd et al. 2010). Studies on synchronous collaboration are either in a face-to-face context (e.g. Storch 2005; Amirkhiz et al. 2013) or do not revolve around a piece of writing as the final product (Lee 2008). Most are exploratory within

a very specific context (activity design, duration, course context, etc.). Consequently, findings are somewhat inconclusive. Collaborative L2 writing is generally thought to provide many opportunities for learner interaction (and hence L2 development). In these interactions, most learners tend to focus on meaning rather than form. Furthermore, the ubiquity of text in digital writing and discourse seems to be conducive for language awareness/noticing (cf. 2.4.3 Collaborative L2 writing with technology: related research studies). Therefore, the intent of this PhD project was to investigate synchronous collaborative writing with technology, a research focus which has, to date, received scant attention.

This study's main research interest was: "How do groups of L2 students negotiate the synchronous collaborative text creation process with *Google Docs*"? In order to explore this new way of working together in a feasible fashion, three aspects of the synchronous collaborative writing process were analysed: First, the students' use of communication channels within the *Google Docs* document in terms of time spent⁵¹. Second, the students' focus in their task-related discussions (primarily in the chat feature)⁵². Third, the students' perspective on their collaborative writing experience⁵³. The final texts were graded and used as an auxiliary data point to better understand the findings from the three aforementioned analyses (4.1 The final texts). Text edits made by the participants were selected and incorporated only to add to the analysis of discussion episodes and channel usage (cf. 3.4.3.3 Selective inclusion of text revision activity). The findings of these three analyses were interpreted with regard to the theoretical concepts put forward in the thesis, and are summarised in the following.

5.1.1 Learning via interaction

From a second language acquisition perspective, it has been demonstrated that collaborative L2 writing is conducive to L2 development. In collaborative writing, learners are confronted with large amounts of L2

⁵¹ Research question one: How much time do small groups of L2 students spend in the three communication channels of *Google Docs* in a synchronous group writing activity?

⁵² Research question two: What do small groups of L2 students (not) focus on in their task-related meta-discussions?

⁵³ Research question three: How do L2 students experience the synchronous collaborative text creation process with *Google Docs*?

material. According to the input hypothesis, this exposure to L2 input may facilitate language development as learners focus on the meaning of the text and, over time, develop productive language capabilities by receiving enough comprehensible input. However, comprehensible input (and just reading or listening for the gist) does not seem to be sufficient to induce learners to use accurate language. As learners produce L2 output, they are forced to challenge their ideas about how language works and put these concepts into action. Consequently, learners engaged in language production are likely to notice gaps in their linguistic knowledge and, in turn, create, modify or test hypotheses about language. In other words, language production facilitates noticing, a prerequisite for turning input into intake. The interactions of learners during a collaborative writing activity are not limited to receiving comprehensible input and creating accurate output. Often, the interactions result from non-comprehension and require negotiation for meaning, which facilitates language development as it connects input, the learners' attention, and output in a meaningful way (cf. 2.1.1 Cognitive SLA theories: Input, Output, Interaction). From a socio-cultural point of view, interaction not only aims at making the message more comprehensible, it also provides opportunities for languaging, i.e. learners 'talking language through', which again raises awareness of language phenomena and enables learners to create language output that they might not be able to produce individually. As researchers, we can exploit learners' interactions in collaborative writing to better understand learning processes as they verbalise their thought processes in their dialogues (cf. 2.1.2 Socio-cognitive SLA theories: Social learning).

The second analysis investigated the primary site for student interaction: the students' focus in their discussion episodes⁵⁴. Students' chat turns (and a few discussion contributions originating in the text and comments section) were categorised according to a taxonomy, informed by both theory and the data of this study. The 561 discussion turns coded revealed a prevalence of four focus areas: workflow management (1), content

⁵⁴ Research question two: "What do groups of L2 students (not) focus on in their task-related meta-discussions"?

(2), meaning-oriented language-related episodes (3), content structure and coherence (4). Students dedicated most of their effort to discussing workflow management and content-related questions. This finding (focus on meaning rather than on language form) is in line with other studies on computer-mediated collaborative writing (e.g. Kessler 2009; Kessler et al. 2012). However, the third most frequent category of discussion was 'meaning-oriented language-related episodes'. Lexical choice and questions of phrasing (followed by translations of words and phrases) were the most common language-related issues discussed. Students engaged in languaging, and, hence, collective scaffolding which led to solutions they probably would not have been able to find without the help of their peers. This conscious reflection on language is conducive to language acquisition as it fosters noticing, a prerequisite for internalization (= learning) of certain language phenomena. The fourth most frequent category was 'content structure and coherence'. As this activity was carried out in a synchronous fashion, student interaction increased the opportunities for collaborative dialogue compared to asynchronous collaboration. Participants dedicated little time to talking about surface-level issues like form-oriented language-related episodes, and layout. Given the possibility to easily edit text at any time and the students' high language level (C1, on average), this comes as no surprise. The written nature of the interaction adds value compared to oral collaboration: "[Synchronous computer-mediated] interaction results in an increase of textual production as opposed to oral production, an increase in opportunities for practice in writing, and experimentation with alternative phrasings within the full context of the text" (Kessler et al. 2012: 100). In addition, there seemed to be a negative correlation between the groups' chat engagement and their performance in the final texts. Groups one and five dedicated a very high proportion of their task time to chatting and these two groups scored lowest in the final texts. (By contrast, group six spent the least time on chatting and scored the highest in the final texts.) The analysis of discussion episodes revealed that groups one and five spent a significant amount of time discussing workflow management and content. Presumably, these groups ran into time management issues as they struggled to establish

a common content understanding and a joint strategy to solve the collaborative writing task.

5.1.2 The collaborative writing process

It has also been shown that writing is a complex and dynamic phenomenon. Flower and Hayes identified three sub-processes of writing: planning (1), translating (2), and reviewing (3). The “monitor” sub-process functions as a mediating device for the writer when moving from one sub-process to the next. All sub-processes are interconnected and hierarchical (rather than sequential) in nature. In his L2 model of writing, Zimmermann describes the writing process in much greater detail, involving L2-specific processes like “tentative formulations” and the application of “L2 problem-solving strategies”. Contrary to Flower and Hayes’ model, Zimmermann argues that certain sub-processes of the writing process do, in fact, have privileged positions of occurrence. However, the concepts of writing as a dynamic process and as a linear sequence of phases are not mutually exclusive. The different draft phases can be convenient markers to describe the development of a text without negating the dynamic nature of the writing process. From a pedagogical perspective, L2 writing can fulfil two functions in the language classroom. It can be a focus of learning itself (learning-to-write) and a facilitator of other aspects of learning, e.g. writing-to-learn content. Both played a role in the collaborative writing task investigated in this study (cf. 2.2 The L2 writing process). The analysis of discussion episodes revealed that participants verbalise the writing process in their discussions. The distribution of the four most frequent discussion episode categories⁵⁵ over the duration of the collaborative writing activity resembled the sub-processes of the aforementioned writing models. In the first third of the activity, the discussion categories ‘workflow management’ and ‘content’ were dominant; this resembles Flower and Hayes’ “planning” process. In the second third of the activity, the aforementioned categories decrease and language-related and structure- and coherence-related discussions rise as students engage in what Flower and Hayes call “translating” (the “formulate”

⁵⁵ 1. Workflow management 2. Content 3. Meaning-oriented language-related episodes 4. Content structure and coherence.

component would be the equivalent in Zimmermann's L2 writing model). Zimmermann's "L2 problem solving" component as an L2-specific feature would explain the high number of language-related deliberations – a process unique to L2 learners. In the last third of the activity, all four categories are on the decline but do not disappear entirely. This can be considered proof for the dynamic nature of writing as writers have to circle back to certain sub-processes which were dominant in the beginning. Additionally, this phase of the process resembles Flower and Hayes' "reviewing" process as participants make minor adjustments to the final text. Zimmermann, having the L2 writer in mind, describes this activity in a more detailed fashion in his model, resulting in three sub-components: "repair", "read and reformulate", and "review" – all of which are influenced by the "L2 problem solving component" (cf. 4.3.5 Emergence of the writing process through collaborative dialogue). These formulaic processes were made visible in the discussion episodes, most evidently in the meaning-oriented language-related episodes (cf. 4.3.3.3 Meaning-oriented language-related episodes; 7.7 Meaning-oriented language-related episodes). As the activity was computer-mediated, all interactive processes were recorded in a written form, ready for inspection by the researcher.

5.1.3 Computer-mediated task-based language teaching

The synchronous collaborative writing activity was facilitated by a complex language task. Tasks are purpose-driven learning activities, which result in a clearly defined result (here: a patient handover) relevant to the students' learning needs (here: the ability to communicate effectively in a professional medical environment). The focus is on meaning and language is used in a real or 'authentic' fashion. The ultimate goal of a task is to foster intercultural communicative competence, i.e. the ability to communicate effectively in the target language (cf. 2.3.2 Task-based language teaching). The task was carried out via *Google Docs*, a web-based word processing tool. Such shared documents tools can be considered an evolution of wiki technology. While *Google Docs* still allows for asynchronous collaboration (like wiki pages), it also facilitates synchronous collaboration. This creates a unique collaborative dynamic as all collaborators can access and engage with the content

simultaneously. A group chat function and a comments feature facilitate task-related meta-talk. All content (text, comments, chat log) is in front of the students at all times and can be viewed by them at will. This ready availability of the writing raises the students' awareness of their own writing and can increase the chances of noticing and learning language phenomena. All changes made to the text, all chat contributions, and all comments are saved constantly and, hence, available for investigation by the researcher (cf. 2.4.2 Shared documents: Wikis 2.0).

The first analysis of channel usage⁵⁶ revealed that, given an average task fulfilment time of 51.1 minutes, 41.7 minutes (approximately 82 percent) were spent, on average, per student either chatting or contributing text to the document. Groups spent, on average, approximately 74% of their task time making changes to the text and approximately 51% of their task time making chat contributions. As was argued above, such a high level of active participation in an L2 can be considered a probable site of L2 development as students created, received, and negotiated vast amounts of L2 material. By looking at instances of synchronous activity (or the lack thereof) on a global channel usage level, it was hoped that different patterns of working together on a task, namely cooperation or collaboration, could be identified. The literature suggests that “[...] collaboration has greater potential to improve the end product’s quality, whereas the division of labor in cooperation might provide for speedier, more convenient task completion. (Arnold et al. 2012: 433)”. However, neither the analysis of chat-text overlap nor the analysis of instances of synchronous text editing could provide such insights. The overlap of chat activity and activity in the text was not a reliable indicator of division of labour (cooperation). With the text and the chat right next to each other, students could be active in either channel and work on the same aspect of the activity. Similarly, synchronous writing activity was not a reliable indicator of either pattern (cooperation or collaboration). Participants who were active in the text simultaneously could be working on the exact same sentence or working rather autonomously, several

⁵⁶ Research question one: “How much time do small groups of L2 students spend in the three communication channels of Google Docs in a synchronous group writing activity?”

paragraphs apart from each other. Text ownership as an indicator of either pattern is problematic in a synchronous context where several additions and revisions of text by different authors happen within minutes or even seconds. As collaboration can be defined as “[...] a coordinated attempt to solve and monitor a problem together, with perhaps some division of labour on aspects of the problem” (Scanlon 2000: 464–465), I argue that synchronous collaborative writing, by default, is collaboration rather than cooperation. The accessibility of communicative choices within the *Google Docs* document empowered the students to use whatever communication channel they saw fit for the sub-task at hand (cf. 4.2 Communication channel usage).

The task design of the activity could be considered artificial to some extent as collaboration was computer-mediated despite the fact that students were in the same room. This approach was chosen deliberately to both explore synchronous computer-mediated collaboration in a somewhat controlled environment and create many opportunities for student interaction. Furthermore, task instructions were deliberately kept at a minimum to make the students engage naturally with this technology. As was mentioned before (cf. 5.1.1 Learning via interaction), few students struggled with the all-written interaction and the lack of clearer guidelines on how to work together in such an environment. The small amount of negative feedback in the post-activity survey concerned the somewhat confusing nature of synchronous collaborative writing and the lack of face-to-face interaction. These participants suggested changes to increase the opportunities for face-to-face interaction, namely adding audio and/or video chat capabilities or by just making the activity face-to-face. One third of the students found the allotted task time too short. These critical remarks came primarily from those students who chatted most and who scored lowest in the final texts. This implies that they lacked a common content understanding from the workshop and online phase preceding the activity. Furthermore, they would have probably benefited from a collaborative script or a guideline on how to work together in a synchronous computer-mediated writing activity. In general, however, students felt very positive about the synchronous collaborative writing activity. The main advantages, according

to the students, were time efficiency, transparency, and the multimodality aspect of the activity. Groups who scored highest in the activity (groups six and eight) seemed to have exploited specifically these traits of synchronous shared documents technology.

5.2 Implications for foreign language teaching and research

By introducing clear-cut research questions to a research project, we achieve two things: On the one hand, the project becomes more focussed as certain aspects are investigated in isolation (at least initially). On the other hand, selecting certain areas of interest inevitably means discarding (or neglecting) others. Such focus of time and resources is needed and reasonable in qualitative research (cf. Flick 2011: 134). However, there are many interesting and relevant aspects that emerged during the research process which are outside of the somewhat narrow scope of the research questions but still highly relevant for the field of, in this case, foreign language teaching. These adjacent areas of interest will be discussed in the following.

5.2.1 Legal and ethical concerns in school and university implementation of shared documents technology

The implementation of *Google Docs* in a university *Moodle* environment was a given in this study. Choosing the right technological tool for the purpose and incorporating it into an existing classroom ecosystem can present a series of challenges: Which existing systems does the institution (school or university) rely on? Can a teacher and/or researcher obtain administrative access to make changes or implement new technologies? Is there technical support? What are the legal considerations? What is the best tool for the job?

According to the Bavarian federal commissioner for data protection, Thomas Petri, data protection is a fundamental right, which postulates certain rules, particularly in the school context⁵⁷: First, user data can only be gathered if the users agree. If students refuse to surrender their data, they must not fear negative consequences. Second, user data may only be gathered if its collection serves a well-defined purpose in line with the overall educational mandate of the school. Third, the collection of user data has to be in proportion to its purpose. This set of guidelines makes it rather clear that commercial, web-based, US-hosted cloud services can be a problem and that,

⁵⁷ Cf. https://www.datenschutz-bayern.de/0/Broschuere_Schule.pdf; accessed: 29 May 2017.

from a legal point of view, teachers should rely on existing infrastructure. Fortunately, there are open source programs which allow for locally installed environments (i.e. on a school server) where user data is not willingly surrendered to big corporations overseas. *Etherpad*, for instance, is “[...] a highly customizable Open Source online editor providing collaborative editing in really real-time”⁵⁸. *Etherpad* supports multi-user synchronous text editing with rather basic formatting options. However, it is very well-suited for educational purposes as changes made to the text are, by default, colour-coded which makes it very easy to track changes of individual users. Users do not have to create accounts and students join a document via a link (sent to them via e-mail or published on the learning platform), choose a username and a colour, and start writing. *Etherpad* can be downloaded for free and installed on a local server to facilitate web-based or local collaborative text editing. It can be integrated into newer versions of *Moodle*, the (also) open source learning management platform which is the basis for the Bavarian state-wide learning management system *mebis*⁵⁹. If teachers want to try the program in-class, they can use one of the many freely available *Etherpad* websites like the online writing pad of the *Deutscher Bundesjugendring*⁶⁰, a state-supported charity organisation.

There are also commercial solutions such as *Google Apps for education*⁶¹ (used in this study) and *Microsoft Office 365 for Education*⁶². Both solutions are free of charge once the school or university proves its status as an educational institution. These solutions come with much more than just collaborative writing tools; there are also programs for collaboratively authoring presentations, spreadsheets, and notes. In addition, they offer learning management systems of their own, including user management, web-based file management, and more. However, student data is processed through US servers and there is no ‘small solution’. To use collaborative text editing, an institutional account must be set up and student accounts created.

⁵⁸ <http://etherpad.org>; accessed: 29 May 2017.

⁵⁹ <https://www.mebis.bayern.de>; accessed: 29 May 2017.

⁶⁰ <https://www.yourpart.eu>; accessed: 29 May 2017.

⁶¹ <http://www.google.de/apps/intl/de/edu/>; accessed: 29 May 2017.

⁶² <https://products.office.com/de-de/academic/compare-office-365-education-plans>; accessed: 29 May 2017.

Microsoft's solution has a slight edge over *Google's* product from a data protection point of view as it offers Germany-based servers or even on-site servers for businesses and schools. Additionally, professional solutions, such as from *Google* and *Microsoft*, can provide much higher levels of data security than open source programs. As the name 'open source' suggests, these programs (and their program code) are available for anybody, making them vulnerable to hacking and data breaches. Still, teachers who want to try to incorporate shared documents technology into their teaching practice could be better off starting with the open source tool *Etherpad*, both from a practical and legal point of view.

5.2.2 Shared documents as valuable asset for blended learning

Technology has the potential to transform teaching practices profoundly, but only when integrated in a meaningful way. "It is important that new technologies are integrated into learning and teaching only when driven by pedagogy, rather than technology for technology's sake" (McCarthy 2010: 732). E-learning and blended learning have become buzzwords in educational research over the last decade. While e-learning tried to replicate face-to-face teaching in its early days and hence fell short of its potential (cf. Lee and Duncan-Howell 2007: 486), blended learning turned out to be the more promising concept: "[...][The] implementation of e-learning innovations [such as forms of CMC,] requires integration with face-to-face-learning and hence [...] blended learning is the true innovation 'beyond' e-learning [...]. (Steffens, D., Reiss, M. 2010: 1). There are different ways of merging in-class teaching and online phases; for example, the online phase can prepare students for in-class teaching or in-class teaching and online phases can be intermixed (cf. Meskill and Anthony 2010: 10)⁶³. Creating a meaningful link between the two phases (online/homework and in-class teaching) is important in order to show the learners the relevance of their online work. Such integration can be achieved by, for example, actively integrating the

⁶³ In recent years, the flipped classroom concept has gained tremendous momentum in the educational community. "The basic notion of flipped classroom approach is to deliver the teacher's lectures before class through online videos, in order to free-up the in-class time for active learning and problem solving activities" (Lo and Hew 2017: 1).

online activities into in-class teaching. Shared documents technology can be a powerful asset in a blended learning setting as it caters for both synchronous and asynchronous collaboration. Students can start putting together a group presentation in-class using *Google Presentations* on one or several computers at the same time and finish the presentation outside of class in an asynchronous fashion – all without changing platforms or having to meet to share their work. When asked about possible applications of this method of working together, the majority of participants in this study identified group presentations as the best application outside the context of the study (cf. 4.4 The participants' perspective). The pragmatic affordances of technology integration can make a difference and determine whether students engage actively with one another or not. Ease of use, availability and independence from time and space can render shared documents technology into a powerful tool to merge in-class and online learning. However, the exploratory research design also revealed that computer-mediated collaborative environments with their variety of communication tools can be overwhelming and hence hinder the students' collaborative efforts if left unguided. Designing guidelines on how to best exploit the possibilities of shared documents technology to work collaboratively on a joint project could be a valuable avenue for future research.

5.2.3 Learner analytics: product vs. process assessment

This study investigated the synchronous collaborative writing process of groups of L2 learners. Ironically, the groups' performance in the activity was not assessed according to their collaborative process but only with regards to the quality of the final product. In fact, the analysis revealed that groups who chatted a lot (for a variety of reasons) ran into time management issues which possibly resulted in a less successful product. In other words, groups who communicated a lot were 'punished' for their communicative behaviour by a bad grade as their communicative practices were not taken into consideration when the grades were assigned.

As topic-related metatalk undoubtedly has the potential to become a site for L2 development (input, output, and interaction as second language acquisition facilitators, cf. 2.1 The SLA perspective: Interaction and learning),

it should not only be considered a means for making learning processes visible but also for learner assessment. Through the advent of shared documents technology, co-authored texts (or any type of group effort such as group presentations) can be rolled back from the final product to the blank page in detailed iterations, revealing exactly who contributed and the nature of their contribution at any point in time. Participants in this study positively assessed such transparency since it helped avoid repetition (cf. 4.4.3.1 Synchronous collaborative writing experience). Other studies have shown that high levels of (computer-mediated) transparency in group work can improve the overall quality of student-authored texts as students are more likely to strive for excellence when other students have access to their work (cf. Baltzersen 2010: 794).

Yet, none of the information on the process is typically used to assess the students' performance. Using information on the collaborative process to assess learner performance comes with challenges: What exactly should be taken into consideration? Do students who chat less than their peers but make more valuable contributions regarding the final product get better ratings? Do students, who mainly follow the guidance of their peers and do not engage as actively in the discussions, get a worse rating? How do the 'process grade' and the 'product grade' add up to the final grade? Time is also a consideration. Analysis (and assessment) of the process is much more time-consuming than assessment of a final text. How does this fit into the already tight schedules of schoolteachers? There are no obvious answers to these questions. In my opinion, understanding the process to better interpret the nature of the final product (What went wrong? What did groups who performed better than others do differently?) is currently the best way to meaningfully use information on the process. Understanding how collaborative practices work in such a context, we can adapt our teaching practices and provide more targeted support, such as collaborative guidelines or better content input.

5.2.4 Methodological implications

As mentioned earlier, relying exclusively on *Google Docs'* built-in recording facilities for data collection posed a number of limitations. However, the data

analysis also revealed two methodological implications worth noting. First, the revision history of the documents created a very complex data set by making every single change to the documents available for inspection. The synchronous nature of the task and the inclusion of three writers rather than one individual writer made it virtually impossible to assign text ownership of particular paragraphs to individual participants. Within a few minutes, various group members manipulated sentences, making it impossible to determine text ownership. However, all the tracking capabilities of *Google Docs* can also be used in scenarios where only one writer authors a text. In such contexts, text ownership is irrelevant as there is only one writer. Consequently, it is not necessary to rely on the verbalisation of the writing process. Instead, the revision history, which is less complicated than in a collaborative setting, can be used. Some information is lost but could be recovered by the inclusion of stimulated recall interviews. Nevertheless, shared documents can be a very powerful tool for research on individual writing.

Second, student interaction as both a site for learning and a tool for investigating learning proved to be a perfect fit for language teaching and research. As argued in the theoretical part of the thesis, student interaction in the L2 creates many opportunities for language development as students engage in language production and negotiation for meaning. In addition, students make some of their thought processes available for inspection as they verbalise the necessary steps to solve a complex problem together. Since student interaction not only takes place in a complex computer-mediated environment but also in a face-to-face classroom situation, it can be considered a feasible, accessible tool for educators who want to create a meaningful language learning activity and, simultaneously, want to learn more about their students' learning processes.

Having argued for this minimalistic, low-key approach to data collection and analysis in order to make it compatible with teaching, it is reasonable that more sophisticated approaches to data collection (like eye-tracking or screen recording) and combinations of methods could possibly generate more detailed and convincing insights into learning processes.

Making compromises for feasibility was a deliberate choice but not necessarily the best way of conducting such a project. Follow-up investigations of synchronous collaborative writing could focus on more granular aspects of this phenomenon (rather than the broader scope of this study) and apply more sophisticated means of data collection and analysis.

5.2.5 Theoretical implications

The data analysis revealed that many concepts from related studies and literature can only be applied to a certain degree. The synchronous-asynchronous dichotomy, for example, is becoming increasingly obsolete with multi-modal experiences, such as *Google Docs* or *Facebook*, catering to a variety of use cases, both synchronous and asynchronous. The activity investigated in this study was carried out in a synchronous fashion but the very same technology could have been used in an asynchronous fashion (presumably with profound changes to the writing process). The synchronous-asynchronous dichotomy evolves from a description of technical features of particular CMC tools into a methodological choice when we create opportunities for people to work together.

In addition, there seems to be an “[...] ongoing convergence across media types, represented by the incorporation of chat into various technologies such as websites, interactive television programming, online games, multimedia platforms, and telephony applications, among others. Wherever media are changing, text chat, or something very much like it, seems to appear” (Paolillo, John C. & Zelenkauskaite, Asta 2013: 127). Platforms increasingly offer “[...] formerly separate communication forms [...] within one and the same interface [...]” (Locher 2015: 126), “[...] which makes textual/aural/visual grouping of CMC redundant” (Nguyen 2013: 58). It could be argued that technology, while ubiquitous in our lives, becomes less a focus or concern when integrated into our teaching practices. Its ease of use, accessibility, decreasing costs, and functionality have transformed it into a tool to put methodological considerations into action – rather than central feature of these considerations.

Finally, the dichotomy between collaboration and cooperation turned out to be less applicable to synchronous contexts. Text ownership, an

important dimension for deciding whether participants engage in collaboration or cooperation, is a fluid and hence problematic concept in a synchronous context. I therefore argued that synchronous modes of working together are, by default, instances of collaboration rather than cooperation. Even with instances of cooperation, the tight time frame and the presence of several collaborators at the same time facilitate collaboration rather than cooperation. According to Scanlon, collaboration does not negate the possibility of division of labour: "[Collaboration] can mean a coordinated attempt to solve and monitor a problem together, with perhaps some division of labour on aspects of the problem" (Scanlon 2000: 464–465). In their study on collaborative writing in wiki spaces, Kessler and Bikowski (Kessler and Bikowski 2010) refer to a more refined concept of collaboration by Parks and colleagues who introduce four types of collaboration:

Joint Collaboration [where] to two or more writers working on the same text who assume equal responsibility for its production in terms of official authorship, although individual contributions to the finished product may vary [...].

Parallel Collaboration [where] two or more writers who, although working on the same text, do not assume equal responsibility for its production in terms of official authorship, although again, individual contributions to the final product [may vary].

Incidental Collaboration [where students make] generally brief, spur-of-the moment requests for help directly related to the writing task at hand [...].

Covert Collaboration [...] refers to getting information from documents or other linguistic or nonlinguistic sources during the process of producing a text (Parks et al. 2003: 40).

It appeared that all four types of collaboration occurred in the data set of this study but what does this say about the actual learning opportunities of the participants? I believe that collaboration is a continuum of participant preferences indicative of their chosen level of engagement with the task and other participants. Trying to make each participant engage more actively with their peers through task design or instructions (in other words: make them engage in "Joint Collaboration") seems to be an obvious choice from an interactionist, second language acquisition point of view. However, when we want our students to come up with a great final product in a reasonable

amount of time, less engaging ways of working together with a more specialised division of labour (i.e. a cooperative pattern) may be the better choice. [...] [The] division of labor in cooperation might provide for speedier, more convenient task completion” (Arnold et al. 2012: 433). Talking in an L2 is an L2 learning opportunity in itself, which makes language learning unique compared to other disciplines. But making people talk does not necessarily have to be the number one priority in any given task at any given time. Sometimes we might just want our students to come up with a good essay. It all depends on the focus we want to create.

5.3 Outlook

In this research study, L2 students' collaborative practices in a technology-mediated context were investigated in an exploratory fashion. This investigation has led to a number of interesting findings with regard to interaction and learning. But what are some of the broader implications? The analysis of channel usage revealed that students were not concerned with how *Google Docs* was designed to be used. Although the chat function is meant for chatting (about the text) and the text portion for entering text, participants conversed in the text as well. Of course, such usage is only possible because *Google Docs* allows it. One-purpose CMC tools such *Internet Relay Chat (IRC)* and online forums are clearing the way for multi-modal, multi-purpose technologies which do not dictate a certain use case but allow for a variety of user preferences (cf. Locher 2015: 126). With technology increasingly user-centred and easier to use, it is invading areas which are not commonly associated with information technology, and becoming essentially invisible:

[...] [Technology] may entirely disappear, waiting to be activated by a voice command, a person entering the room, a change in blood chemistry, a shift in temperature, a motion. Maybe even just a thought. Your whole home, office and car will be packed with these waiting computers and sensors. But they won't be in your way, or perhaps even distinguishable as tech devices. This is ambient computing, the transformation of the environment all around us with intelligence and capabilities that don't seem to be there at all (Mossberg 2017).

The convergence of reality and information technology ("ambient computing") is most apparent in the field of virtual reality and augmented reality research. While smartphones as "the ultimate form of personal computing" enable tasks throughout the day and connection to colleagues and friends, there is "[little]-to-no interaction with the physical world around [us]" (cf. Odom 2017). In his article "Personal Computing Is Dead, Long Live Collaborative Computing", tech enthusiast Jason Odom claims that augmented reality technology such as *Microsoft's HoloLens* – a wearable headset which projects information on real world surroundings and therefore 'augments' the reality – heralds new ways of working together. He

references a *Microsoft* keynote presentation which envisions “people standing around a table in a room. The room contains a mixture of physical objects and virtual objects, and an AI-based assistant is on the table along with a few digital objects that it could interact with” (cf. *ibid.*). People, wearing the aforementioned *HoloLens* headsets, can join a meeting both virtually and in reality to work on a joint project using a variety of interactive means. But how will the “invisible computer” (Mossberg 2017) and the emergence of “collaborative computing” (Odom 2017) impact education in the years to come?

“[Integrating] technologies into the classroom leads to substantial changes in social organization, student-teacher relationships, and a myriad of other factors [...]” (Amiel and Reeves 2008: 35), while technology “[...] [has] gotten more reliable and easier to use, and the users more sophisticated” (Mossberg 2017). This implies that technology no longer needs centre stage in our teaching considerations. Compared to only a few years ago, it works relatively well for a majority of our needs. Therefore, teachers and researchers alike can focus again on sound pedagogical concepts and classroom activities, possibly but not necessarily, mediated by technology. This is where the true potential of state-of-the-art technology lies: It becomes inconspicuous and supports rather than distracts our teaching efforts. This study has shown that shared documents technology can be a powerful facilitator of communicative collaboration. Students did not need to be trained extensively in how to use this technology. All participants managed to work together in a productive way, creating generally satisfying texts while engaging in many opportunities for language development in the process. Working together and communicating in the L2 is paramount for second language development from an interactionist SLA perspective. As an added bonus, the all-written nature of computer-mediated communication makes learning processes available for investigation as students verbalise their thoughts when engaging with each other. Therefore, the continuing emergence, increased ease of use, and improved feature set of multi-modal collaborative environments is a welcome trend indeed.

Accessibility, ubiquity, and innovation aside, technology still has to be implemented in teaching contexts. This creates very real pragmatic struggles for educators, students, and parents. Although technology is becoming increasingly easier to use, it currently requires a tech-savvy teacher or IT professional to set everything up initially and to troubleshoot problems. Presumably, this requirement will never disappear entirely, so educational institutions will have to employ technical staff who understand the needs of teachers. As it is completely unthinkable to run a mid-size business without a dedicated IT department, it seems only logical to put IT administrators into schools, who, preferably, have undergone some pedagogical training. Although appropriate educational IT infrastructure is in place in many countries, the situation is still far from ideal in others, particularly in Bavaria (Germany) where this study is situated. Information technology has become a vital part of our educational infrastructure as it powers both the administrative operation of schools (website, recording grades, teacher-parent interaction, etc.) and classroom teaching. Just as teachers should not have to fix a hole in the school roof themselves, they should not be left without support when creating, implementing or troubleshooting technology-mediated learning environments. Only then can technology fade into the background and do what it is capable of doing: empowering great opportunities for learning and research.

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7 Appendix

7.1 Figures and tables

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7.2 Task design

Welcome to your group's *Google* Document!

1. Get started:

Basically, this is a word document - but all of you can work collaboratively **AT THE SAME TIME**. Start clicking around and you'll notice your peers' cursors!

2. A few tips:

2.1. CHAT:

Please **ONLY use the text or the chat to communicate** with your group. In order to open the [chat](#) click on the chat icon top right:



2.2. COMMENTS:

Right-click on the text and hit "comment" to put in a comment. Be sure to put your name in brackets!



3. Your text:

Situation:

You are Dr. Merinstein, Jessica's treating physician. As you are just about to leave for a four-week vacation, you want to make sure that your holiday replacement, Dr. Lisa Cuddy, is aware of Jessica's situation as she will most likely be one of her first key patients.

Objective:

Write an email (300-400 words max.) to Dr. Lisa Cuddy in which you **introduce the patient**, describe the **presenting symptoms (complaints)**, provide a **diagnosis** and recommend a **treatment plan** for her. Be factual and unbiased in your professional judgement.

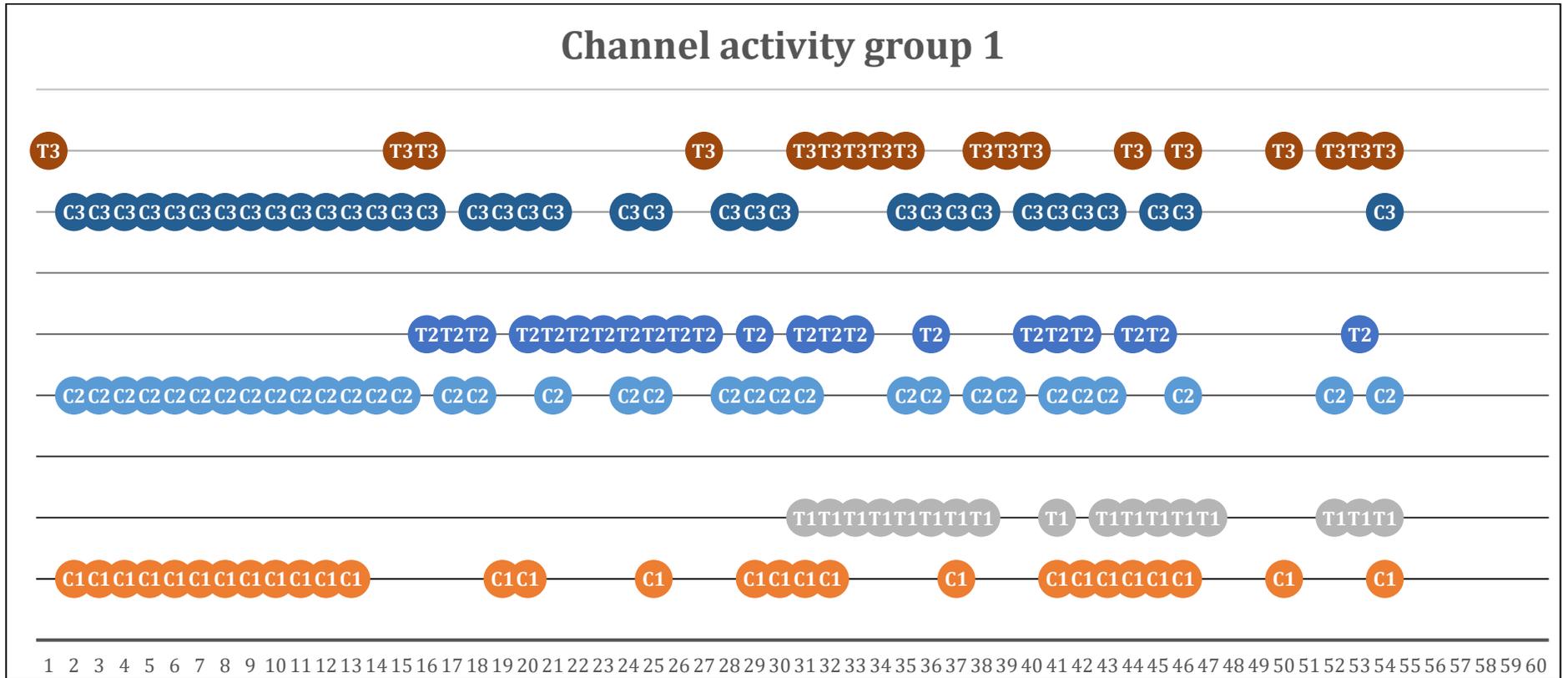
- **Style:** It is a business email.
- **Time:** 45 minutes.

Start writing after the horizontal line:

From:
To:
Subject:
--

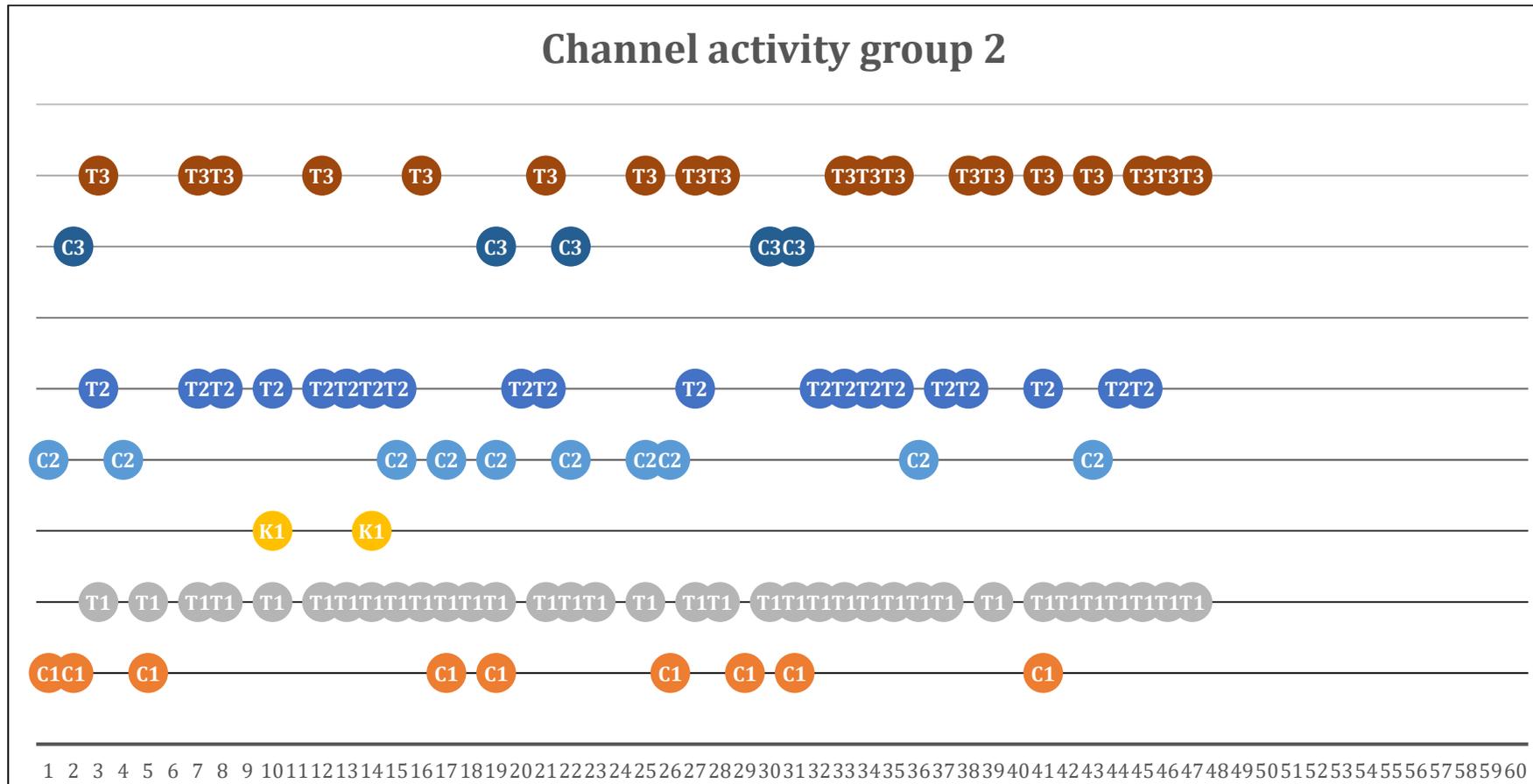
7.3 Data set: Channel usage

7.3.1 Channel usage group 1



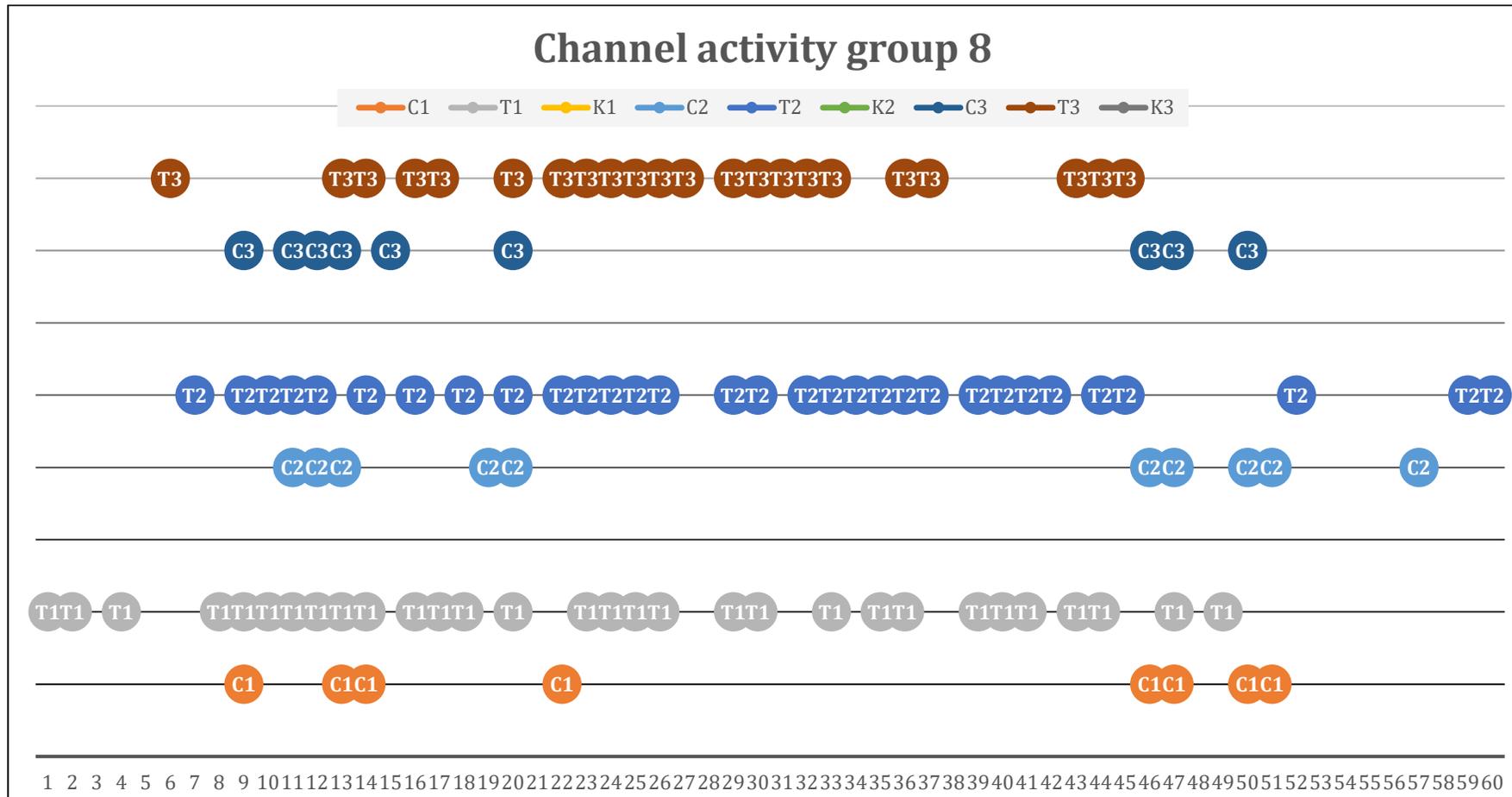
1: Irmgard Apfel; 2: Renate Hiss; 3: Tanja Portlänger

7.3.2 Channel usage group 2



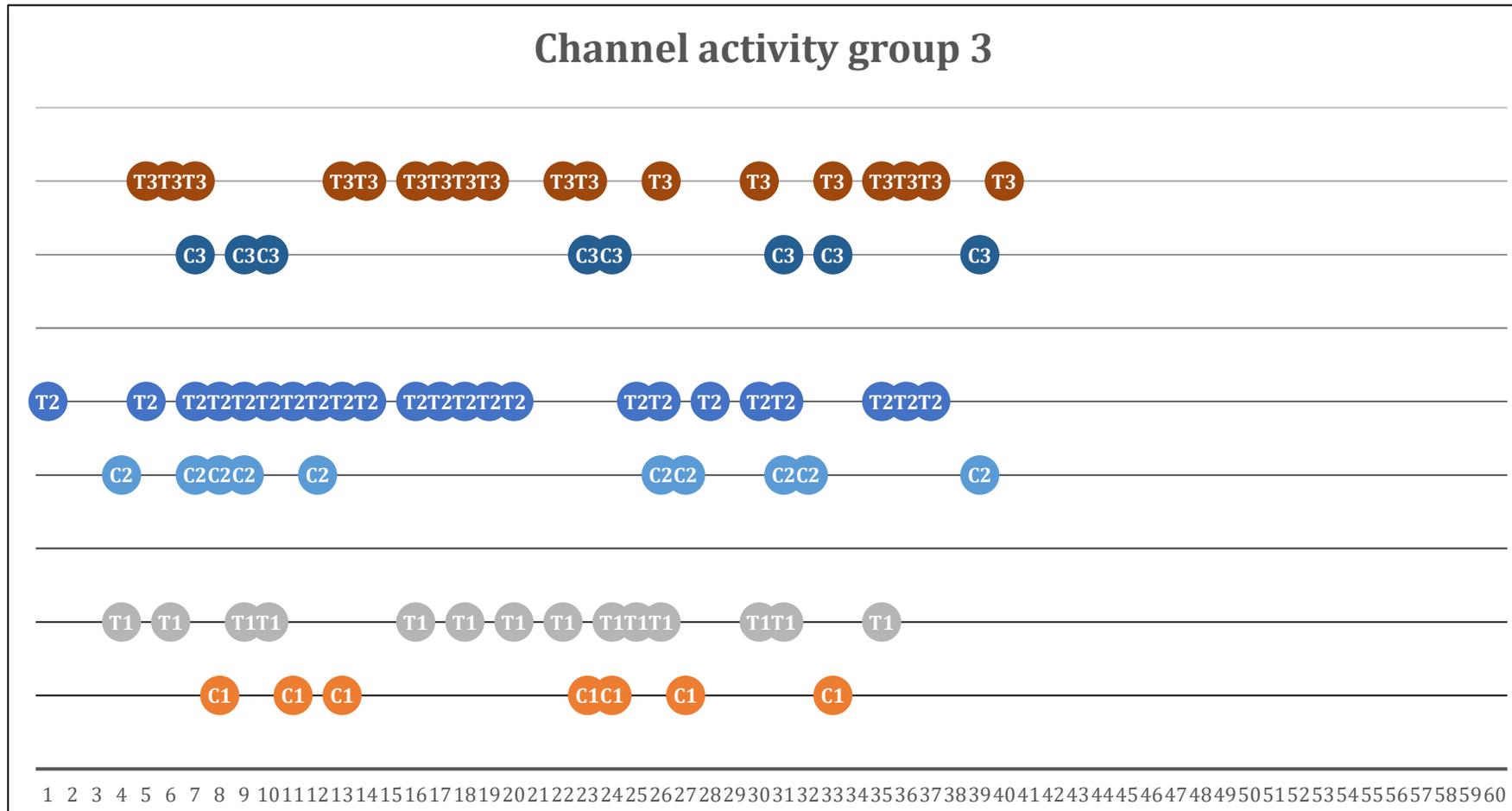
1: Jule Botzel; 2: Norbert Korezko; 3: Susanne Rach

7.3.8 Channel usage group 8



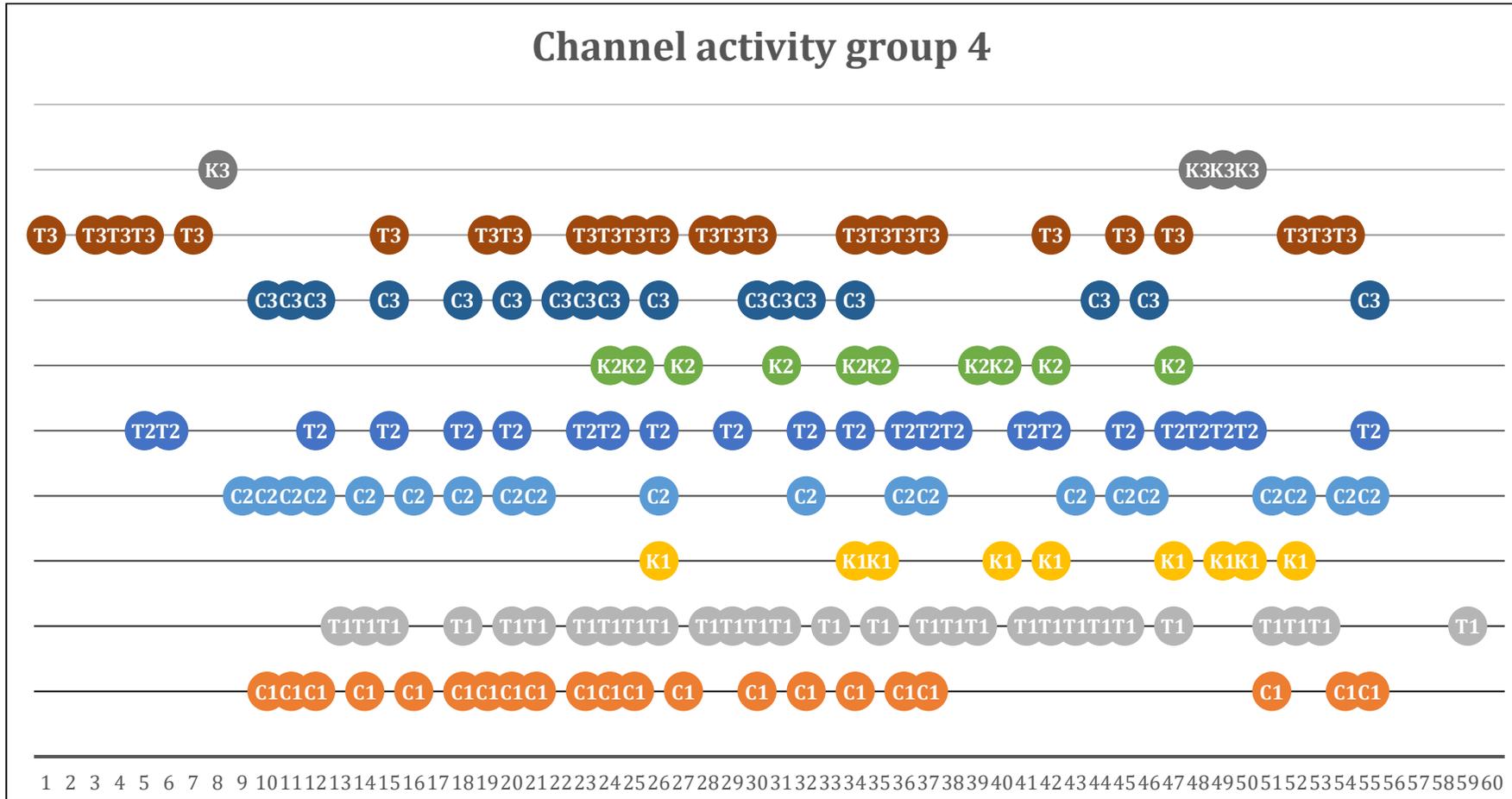
1: Sabine Herold; 2: Elisa Norad; 3: Julia Vait

7.3.3 Channel usage group 3



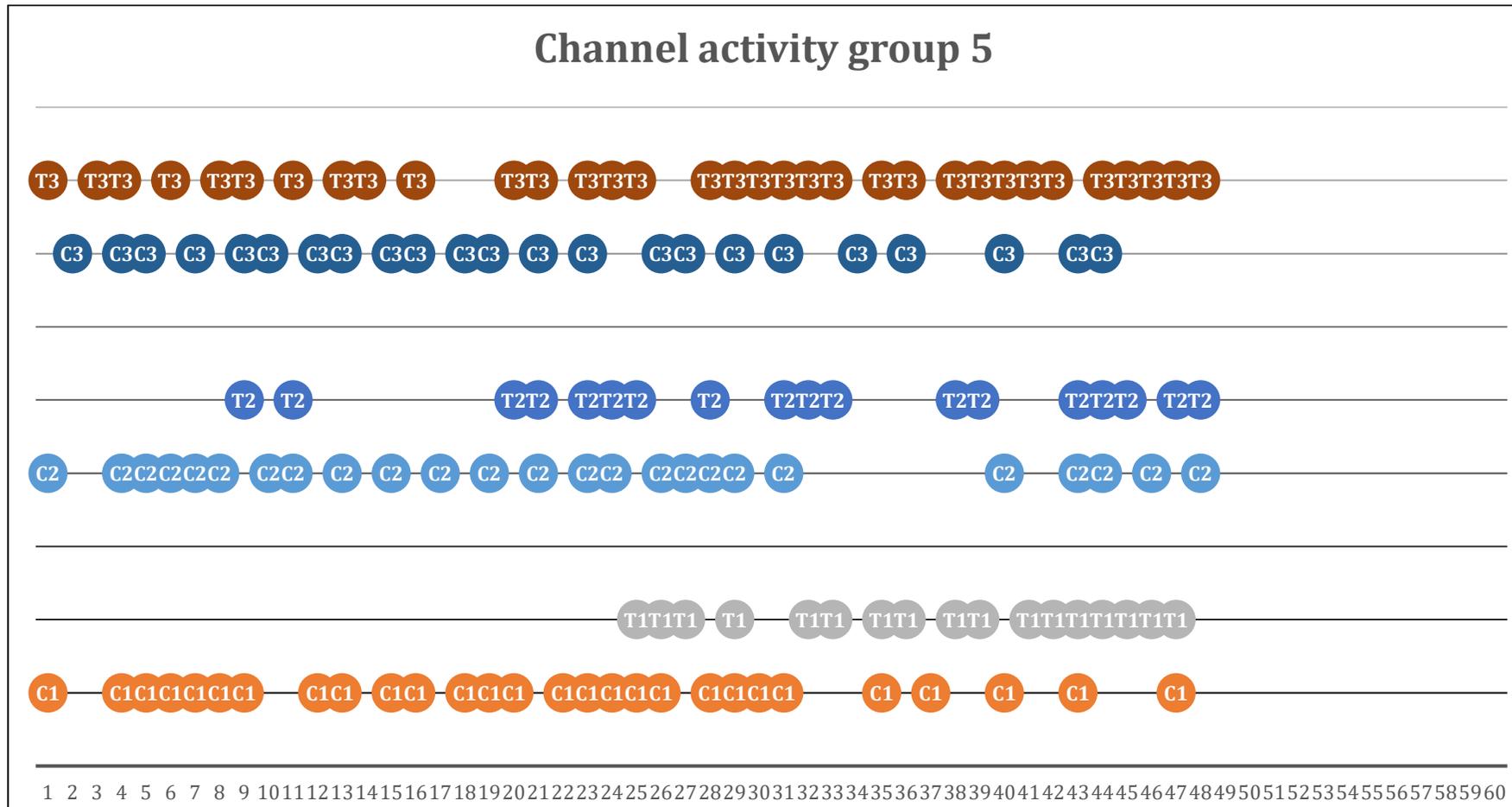
1: Matthias Ronberg; 2: Felicitas Kester; 3: Louisa Rufenbach

7.3.4 Channel usage group 4



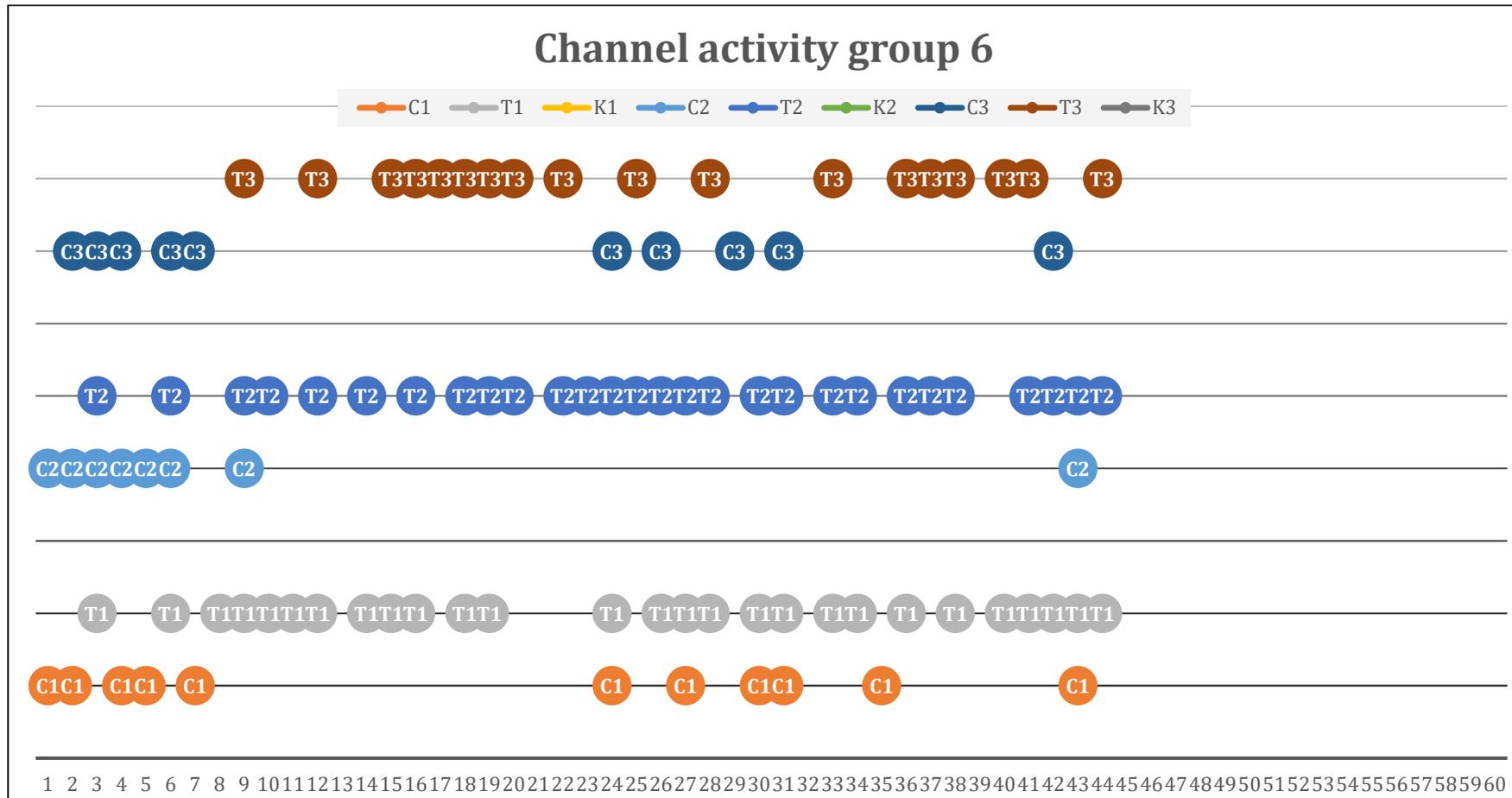
1: Karina Durman; 2: Joseph Lehmuß; 3: Markus Schwarz

7.3.5 Channel usage group 5



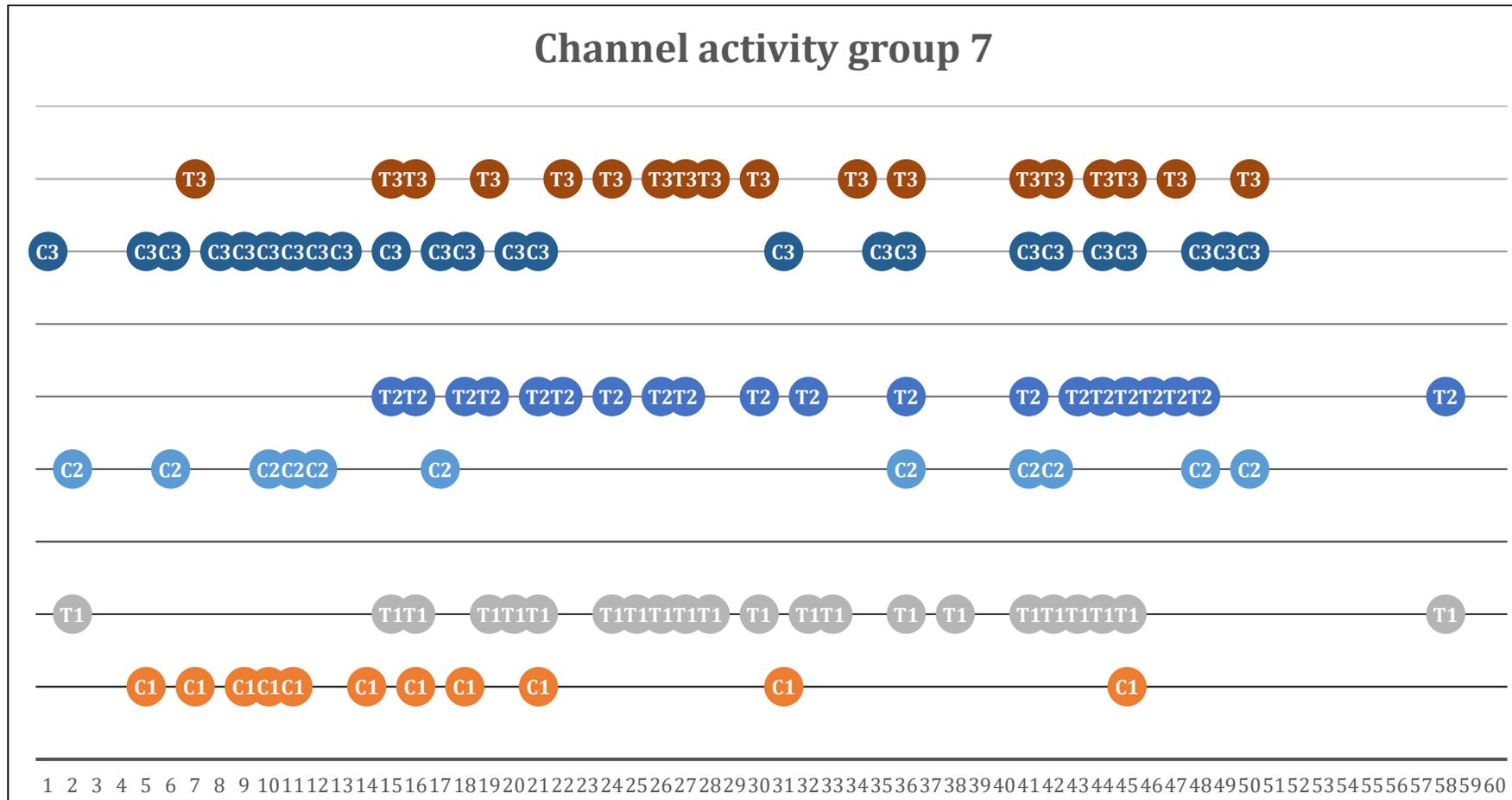
1: Anne Gras; 2: Anne Mauer; 3: Sabine Salus

7.3.6 Channel usage group 6



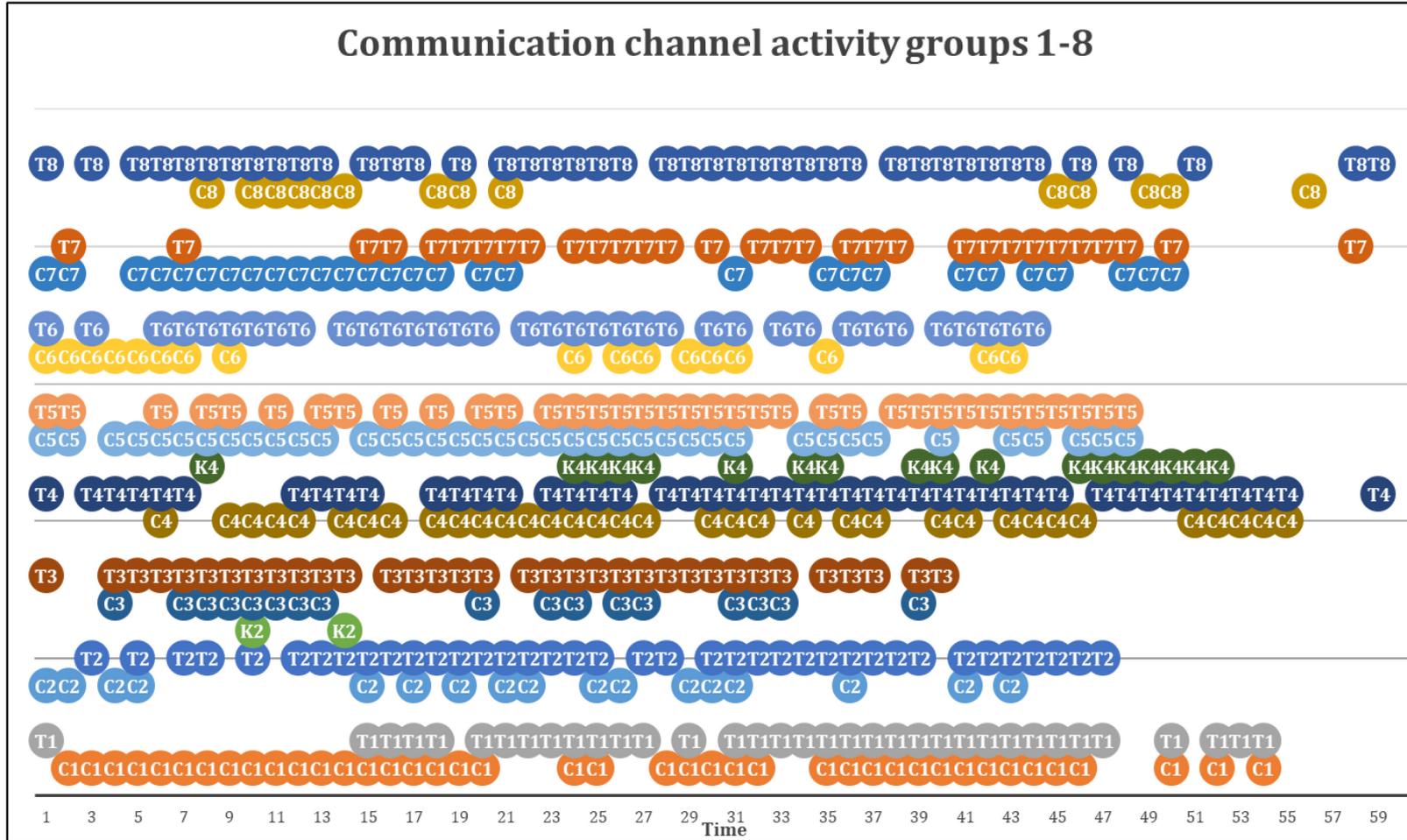
1: Henriette Gabel; 2: Marina Mahwi; 3: Sandra Sole

7.3.7 Channel usage group 7



1: Matthias Gerber; 2: Marwin Merklin; 3: Anna Schulnitz

7.3.9 Overview: Channel usage across groups 1-8



7.4 Data set: Responses pre-task survey

7.4.1 Survey question 1

1. Please select your sex: [Question type: closed]	
Male	Female
6	18

Answers recorded: 24

7.4.2 Survey question 2

2. Please enter your age in years: [Question type: open]						
18	19	20	21	22	23	24
2	8	1	4	1	1	1

Answers recorded: 24

7.4.3 Survey question 3

3. Please name your country of origin: [Question type: open]			
Austria	Egypt	Germany	Palestine
1	1	21	1

Answers recorded: 24

7.4.4 Survey question 4

4. Please name your mother tongue(s): [Question type: open]			
Arabic	Arabic/English	German	German/English
1	1	19	3

Answers recorded: 24

7.5 Data set: Responses post-task survey

7.5.1 Survey question 1a

1a. Have you ever used <i>Google Docs</i> OR similar tools before?	
[Question type: closed]	
Yes	No
6	18

Answers recorded: 24

7.5.2 Survey question 1b

1b. Have you ever worked on a text with somebody at the same time (= synchronously) using <i>Google Docs</i> or similar tools?	
[Question type: closed]	
Yes	No
5	19

Answers recorded: 24

7.5.3 Survey question 1c

1c. If you answered question 1a with "Yes": Which collaborative tools have you used?
[Question type: open]
Dropbox
Google Docs (2)
Google Drive (3)
Facebook
Microsoft Office 365
Microsoft One Drive

Answers recorded: 6

Some participants mentioned more than one product.

7.5.4 Survey question 2a

2a. The time for the task was...		
[Question type: closed; multiple choice]		
Too long	Too short	Just right

2	8	14
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Answers recorded: 24

7.5.5 Survey question 2b

2b. Were the instructions clear?					
[Question type: Scale]					
1 (not clear)	2	3	4	5	6 (very clear)
0	0	0	1	6	17

Answers recorded: 24

7.5.6 Survey question 3a

3a How did the synchronous nature of the task (everybody can write/chat/comment at the same time) affect your group work?		
[Question type: open]		
Group	Participant	Contributions (with tags)
1	Apfel	It was a good new experience [POSITIVE], I think it helps finding new ideas [IDEA GENERATION] and well-structured sentences [LANGUAGE-RELATED PEER FEEDBACK].
	Hiss	good collaboration [POSITIVE], time saving [EFFECTIVE]
	Portlanger	it was good [POSITIVE], a bit weird to do it online even though we are sitting in the same room...that method would have been very helpful for homework I think [NO F2F]
2	Botzel	seemed to be going quite well [POSITIVE]. everyone had their own part to focus on with the others checking for mistakes or better wording. [LANGUAGE-RELATED PEER FEEDBACK]
	Korezko	Without the quick response of the other group members it was hard to write simultaneously in the first place [NO F2F], but after a little time of familiarisation it worked quite well. [POSITIVE]

	Rach	It was an interactive collaboration! [POSITIVE]
3	Bornberg	very helpful [POSITIVE]
	Kester	It was good [POSITIVE], because everyone could bring in ideas and was then brought together. [IDEA GENERATION]
	Rufenbach	Everybody could easily correct minor mistakes [LANGUAGE-RELATED PEER FEEDBACK] nobody had to wait [EFFECTIVE]
4	Durmann	It was good [POSITIVE] because everybody did something and we could always see what everybody else does. [TRANSPARENCY] That helped, because then nobody did stuff double, if someone else was already doing it [EFFICENCY]
	Lehmuss	We did quite well, [POSITIVE] there are lots of means in order to communicate like commenting and chatting, making it a lot easier to do the task [MULTIMODALITY]
	Schwarz	funny and effective [POSITIVE]
5	Gras	It was a little chaotic at first [CONFUSING], but once you get used to it, it works quite well [POSITIVE].
	Mauer	First it is a little confusing [CONFUSING] but you soon get used to the system [POSITIVE]. It was helpful to have an extra chat to discuss the text. [MULTIMODALITY]
	Salus	It did work pretty well - we split some tasks, discussed problems and helped each other, [POSITIVE] though sometimes it was difficult to follow on the chat. [CONFUSING]
6	Gabel	I liked that I was able to read the others text [TRANSPARENCY]. That way any overlap or repetition can be avoided. [EFFICENCY]
	Mahwi	As we divided the tasks though the chat window, we

		we able to work on all at the same time on our individual tasks. One could also read what the other were writing. that saved a lot of time! [EFFICIENCY] [TRANSPERENCY]
	Sole	It definitely had a positive effect. [POSITIVE] It made us work efficiently. We were able to finish our task in the smallest amount of time possible. [EFFICIENCY]
7	Gerber	a little bit of advantage [POSITIVE] chat was quite helpful [MULTIMODALITY]
	Merklin	I think the velocity of group was reduced a bit. [TIME-CONSUMING] Nevertheless it was easier for oneself to concentrate on the part working on individually. [POSITIVE]
	Schulnitz	it was rather complicated as we couldn't talk to each other and could not find a solution together [NO F2F]
8	Herold	it was funny ;) [POSITIVE] we could work great together and help each other out with grammar, vocabulary or structure [LANGUAGE-RELATED PEER FEEDBACK]
	Norad	I think it actually went quite well! [POSITIVE] I liked the fact that we always knew who was adding stuff and that we could discuss things in the chat. [TRANSPARENCY] [MULTIMODALITY]
	Vait	helped to communicate [MULTIMODALITY] saved time [EFFICIENCY]

Answers recorded: 24. Tags assigned: 45.

Obvious surface-level language mistakes in the participants' replies have been corrected for improved readability. Answers are already tagged with categories which have been assigned (exclusively) inductively by the author.

Table of tagged categories:

Positive						Negative		
General	Efficiency	Idea gener	Language-	Multimoda	Transparen	No F2F	Confusing	Time-consuming
16	8	2	4	5	3	3	3	1

7.5.7 Survey question 3b

3b If you could change the way this task (= write an email together with the help of 1-2 colleagues) was carried out: How would you do it??		
[Question type: open]		
Group	Participant	Contributions (with tags)
1	Apfel	Nothing, I liked it. Something different and new! [NO CHANGE]
	Hiss	not really, it's surprisingly effective without face-to-face conversation (no arguing ;) [NO CHANGE]
	Portlanger	I think it would be less time consuming if we would have simply done it in groups talking. But an advantage of this way is that everyone gets to do or write something [MAKE IT F2F]
2	Botzel	I think it was good the way it was - nothing to change! [NO CHANGE]
	Korezko	I don't think I would change a thing [NO CHANGE]
	Rach	I think it was good the way it was carried out. [NO CHANGE]
3	Bornberg	No [NO CHANGE]
	Kester	Nothing, it was good. [NO CHANGE]
	Rufenbach	As it worked quite well, I would prefer this way. [NO CHANGE]
4	Durmann	I wouldn't really change anything [NO CHANGE]
	Lehmuss	do not know [DO NOT KNOW]
	Schwarz	maybe that way [NO CHANGE]
5	Gras	Actually, I'd just give the students a bit more time... like 10 minutes or so. Other than that, I have nothing to complain about. [MORE TIME]
	Mauer	I would prefer talking about the e-mail and design the e-mail orally. [MAKE IT F2F]

	Salus	maybe 5 more minutes to finish the task, maybe read an example e-mail before, so we had a better idea what it should look like [MORE TIME] [BETTER INSTRUCTIONS]
6	Gabel	I think it's easier when you have some sort of personal communication after all. It was very hard to keep up with everyone's' train of thought when organizing how we wanted to do it. But I realize of course, that most of the time all communication goes via technology. [MAKE IT F2F]
	Mahwi	I won't change anything I guess [NO CHANGE]
	Sole	I am actually quite impressed with the program. As I said before I believe it is a great way to be efficient. If I could change something I would add an audio chat to it in order to communicate with my teammates without losing extra time writing them messages. We could talk while writing. This way we could even be more efficient. (P.S.: This would of course work best if you're the only one in the room. Otherwise you would be distracted by people around also talking to their teammates!) [ADD AUDIO CHAT] [MAKE IT AN ONLINE TASK]
7	Gerber	perhaps a voice chat [ADD AUDIO CHAT]
	Merklin	I think it was quite good, so I wouldn't change anything basically. [NO CHANGE]
	Schulnitz	Everything is being discussed personally and one person is writing [MAKE IT F2F]
8	Herold	don't know... it names the task properly and explains what to do - why change? [DO NOT KNOW]
	Norad	Orally? But still liked the idea! [MAKE IT F2F]
	Vait	- [NO CHANGE]

Answers recorded: 24. Tags assigned: 25.

Obvious surface-level language mistakes in the participants' replies have been corrected for improved readability. Answers are already tagged with categories which have been assigned (exclusively) inductively by the author.

Table of tagged categories:

No change	Do not know	More time	Make it F2F	Better instruc	Audio chat	Online task
12	2	2	5	1	2	1

7.5.8 Survey question 3c

3c How would you (possibly) use this kind of synchronous collaborative technology in your private or personal life?		
[Question type: open]		
Group	Participant	Contributions (with tags)
1	Apfel	Maybe on work that should be done for the university e.g. presentations. [PRESENTATIONS]
	Hiss	group tasks for university, like talks etc. [PRESENTATIONS]
	Portlanger	maybe if I had to do presentations together with others [PRESENTATIONS]
2	Botzel	for presentations in a group or essays that are to be written with several people [PRESENTATIONS] [VARIOUS]
	Korezko	I would use it in order to work with other people, who are not in range to meet them personally while being in need to work with them. [GENERAL TEAM WORK]
	Rach	I would use it to prepare presentations for university courses. [PRESENTATIONS]
3	Bornberg	working at a project in a group [GENERAL TEAM WORK]
	Kester	Group work, working from home. [GENERAL TEAM WORK]
	Rufenbach	maybe for planning events [PLANNING EVENTS]
4	Durmann	maybe if I have to prepare a presentation with

		somebody else that could be very helpful because we could both work from home [PRESENTATIONS]
	Lehmuss	for planning something if you cannot meet [PLANNING EVENTS]
	Schwarz	all kinds of teamwork, presentations etc [PRESENTATIONS] [GENERAL TEAM WORK]
5	Gras	Probably for group works, such as presentations. [PRESENTATIONS] [GENERAL TEAM WORK]
	Mauer	Maybe for presentations in group work. [PRESENTATIONS]
	Salus	It's a quite nice possibility to create presentations as a group. [PRESENTATIONS]
6	Gabel	For any further group projects and group works. Maybe even collaborative summaries for the next exam. [GENERAL TEAM WORK] [VARIOUS]
	Mahwi	I am not quite sure if this applies to our studies (medicine) but it is certainly a very good tool for team work! [GENERAL TEAM WORK]
	Sole	I believe we already do that through Facebook, Whatsapp and similar online technologies. I believe it has the same effect of efficiency. [VARIOUS]
7	Gerber	could help me in any use of collab. task [GENERAL TEAM WORK]
	Merklin	Maybe it would be helpful preparing speeches or similar tasks. [PRESENTATIONS]
	Schulnitz	maybe for a brainstorming task or to make a list for a big event or a guest list, but not for working on a text [PRESENTATIONS] [PLANNING EVENTS]
8	Herold	for working on presentations maybe or sharing information everything else would be too complicated [PRESENTATIONS] [VARIOUS]

	Norad	not really I think, still prefer personal conversation [VARIOUS]
	Vait	maybe to write the doctor-patient dialogue in groups [VARIOUS]

Answers recorded: 24. Tags assigned: 30.

Obvious surface-level language mistakes in the participants' replies have been corrected for improved readability. Answers are already tagged with categories which have been assigned (exclusively) inductively by the author.

Table of tagged categories:

Presentations	Event planning	General team work	Various
13	3	8	6

7.6 Data-set: Compiled data-set with coded discussion episodes

As the compiled dataset consists of several hundred pages, it is included digitally on a CD-ROM (cf. 7.8 CD-ROM: Table of contents).

7.7 Meaning-oriented language-related episodes

Group	Start (min)	Turns	Phenomenon
1	18 (11:08)	1	Register/style
	20 (11:10)	1	Lexical choice
	20 (11:10)	1	Phrasing
	21 (11:11)	2	Translation (word)
	24 (11:14)	1	Lexical choice
	24 (11:14)	1	Lexical choice
	28 (11:18)	10	Lexical choice
	30 (11:20)	1	Translation (phrase)
	36 (11:26)	1	Phrasing
	37 (11:27)	7	Translation (phrase)
	40 (11:30)	1	Phrasing
	41 (11:31)	1	Phrasing
	42 (11:32)	1	Phrasing
	44 (11:44)	5	Translation (phrase)
2	15 (11:04)	1	Phrasing
	17 (11:06)	2	Register/style
	19 (11:08)	3	Phrasing
	25 (11:14)	5	Lexical choice
3	16 (11:02)	1	Lexical choice (TEXT!) + solved in the text
	24 (11:10)	2	Translation (word)
	27 (11:13)	2	Translation (phrase)
	32 (11:18)	3	Translation (phrase)
4	31 (11:13)	4	Lexical choice (in the comments!)
	32 (11:14)	2	Translation (word) + solved in the text
	34 (11:16)	2	Lexical choice (in the comments!)
	36 (11:18)	5	Lexical choice
	39 (11:21)	6	Translation (word; in the comments! + solved in the text)

	46 (11:28)	1	Lexical choice
	48 (11:30)	4	Phrasing (in the comments!)
5	22 (11:10)	4	Register/style
	28 (11:16)	2	Lexical choice
	32 (11:20)	1	Translation (word; in the text! + solved in the text)
	47 (11:35)	1	Phrasing (+ solved in the text)
	47 (11:35)	1	Lexical choice (+ solved in the text)
6	No meaning-oriented language-related episodes!		
7	37 (11:23)	1	Phrasing
	41 (11:27)	1	Register/style
	44 (11:30)	1	Register/style
	49 (11:35)	1	Phrasing
8	18 (11:02)	3	Translation (phrase; in the text)
	22 (11:06)	1	Lexical choice (+ solved in the text)
	23 (11:07)	3	Lexical choice (in the text!)
	47 (11:31)	2	Register/Style
	52 (11:36)	2	Translation (phrase)

7.8 CD-ROM: Table of contents

The attached CD-Rom contains three folders:

- 1. PhD thesis (PDF)**

This folder contains this thesis in a digital form (PDF).

- 2. Final texts graded**

This folder contains all eight final co-authored texts with comments and grades.

- 3. Compiled data sets coded**

This folder contains all eight collaborative data sets, including the (handwritten) codes of the analysis of discussion episodes.